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Regulation and the Mayors

In the program for the conference of mayors which is to be held in Philadelphia next week it is natural to find a preponderance of public regulators. A rough classification of the speakers shows that six are presumably identified with the company point of view, three are from state commissions, four will certainly speak for city regulation, and six, although active on the public side of regulation, have had parts in various movements for local and for either state or federal control. Those who are placed in the last-named group under our admittedly arbitrary classification are Congressman Robert Crosser and Messrs. Delos F. Wilcox, Edward W. Bemis, Charles E. Merriam, Frederick C. Howe and Louis D. Brandeis. Representatives of the companies are fortunate in their opportunity to say a word for the abused and misunderstood privately owned public utility. It is to be expected that argument will result from the presentation of views given by different sides of the living issue between producer and consumer. It is a meeting primarily of the mayors, and, however much they may want their ideas to prevail, they have courteously given the other side a chance to be heard. The results accomplished by the discussion will be the test of the real value of the conference, and prejudgment should be withheld. What the mayors are likely to hear, if they do not know it already, is that there is a very earnest sentiment in favor of regulation among public service corporate officials and a willing acceptance by most companies of policies that give fair protection to capital accounts and the rate of return. On the other side they will undoubtedly hear pleas for municipal control and, to cite the allotment of a part in the program to "fifteen-minute reports from managers of typical municipal plants," likewise for municipal ownership. On the whole, however, it is regulation that is the apparent accepted subject of the gathering.

Economies in Distribution

Opportunities to save money either in first cost or in the operating expenses of electrical distribution systems are far from exhausted, and it is a question if any branch of electrical service offers a better field for study on a rainy day than does this. It will repay many engineers associated with central stations to analyze the mechanical details of lamp suspension, transformer mountings, motor supports and many other similar matters. In factory work transformers are now sometimes placed on concrete piers instead of being hung on complex wooden frames involving a considerable bill for material in erection; lamps that are installed over suburban railway-station platforms without roofs can be effectively supported from a catenary steel wire of long span, doing away with the need of frequent and obstructing wooden or iron posts; and in some classes of work, as in grain elevators and other plants where the office lighting constitutes a very small proportion of the total illumination service, without demands for extremely close voltage regulation, the installation of separate transformers for lighting is being abandoned. All the energy used in many such cases is billed at a single rate, and, with care in circuit designing, the service reasonably meets the requirements at a considerable saving in investment. The advent on the market of portable substations and of standard structural-steel line towers of small size is also a movement in the right direction. The older the far-sighted electrical man grows, the more he sees that close attention to the mechanical side of his profession, whether in distribution work or elsewhere, pays adequately.

Satisfactory Gas Rate-Making

The recommendation that was made to the American Gas Institute by its committee on rates, that a permanent committee be established to deal with this subject, is a step in progress whose importance should not be belittled. It is significant of more rapidly changing conditions that the committee says: "There is ample evidence to show that it is a serious question if a flat rate for gas will be commercially satisfactory in the future." The committee might have gone further and expressed the same doubt with respect to the present, if not also to the past. The commercial point of view is not the only one to be considered, however, and the committee does not hesitate to say, in the abstract which is published in this issue, that commissions are considering these questions. With the urban electric railway the gas company has clung to the flat rate when other privately owned public utilities have found promise and prosperity in advanced methods. Steam railroad, long-distance interurban electric railway, electrical central station and telephone have thrived financially and physically on rate-making proportioned according to cost or value of service. Decreasing rates for gas, due to city agitation and commission and court decisions, make the issue more acute for companies now than in the earlier years of the industry. This consideration compels action even if the commercial possibilities of better rate-making do not do so. Plenty of unoccupied area remains for the sale of both gas and electrical energy, and the action of the Gas Institute will accelerate development in the electrical industry.

Stability of the Central-Station Industry

The state of electrical central-station business, like the news of the day, is the subject of interest, study and discussion. In presenting accurately the conditions of the industry the *Electrical World* has a live concern in business conditions. There is a sane, middle body of business men who are neither terrorized by depressing signs nor over-buoyed by jubilant prosperity. As a whole the electrical industry cannot regard its achievement and progress with any other feelings than pride for the past and hope for the future. With good reason it is an optimistic industry. Yet it is not ever so blind as to be unwilling to see and accept judgment forced by hard facts. From the beginning the leaders of the industry have refused to accept discouragement. They have been pushing and alert when business justified expansion, careful only when caution was imposed by banking or temporary trade conditions. But underlying these policies, dominating all other influences, is the steady upward growth which has always been characteristic of electrical central-station history. Growth has gone on in spite of all hindrances. It is going on now. Though the terrible European war, paralyzing the world-wide commerce of nations, has stopped expansion, it has not stopped intensive electrical development in this country. The difficulty of raising new capital has not stopped intensive cultivation in districts where constructed facilities already exist.

Statistics submitted to the *Electrical World* by 60 per cent of the central-station industry in New England show 7.5 per cent gain in gross revenue in August over August, 1913. The gain in July was 9.3 per cent, in June 8.3 per cent and in May 8.4 per cent. Returns from 78 per cent of the central stations in the Pacific and Mountain States show a gain of 4.6 per cent in August over August, 1913. Returns from 71 per cent of the central stations in the Atlantic States show that in August they gained 8.2 per cent over August, 1913. This compared with gains of 10.2 per cent in July, 6 per cent in June and 14.5 per cent in May. These facts accord in general with the statements from prominent men published in these columns, that increases are still maintained, though they may be at reduced rates. Elsewhere in this issue Mr. S. R. Bertron says that so far this year the lighting companies represented by his firm have increased in gross income 6 per cent over last year. Allowing for the reduction in general trade activity in the early months, this is a fair average gain. He reiterates his confidence in public utility securities.

We present in this issue the wholesome discussion of conditions by Mr. Holton H. Scott, president of the N. E. L. A. Saying that conditions are being readjusted rapidly and that increases in gross income are still shown, Mr. Scott declares that new-business campaigns of the central stations will lead to increased output and thus inevitably to demands upon manufacturers and jobbers. He is, of course, relying upon the recuperative power of the industry, which has never failed. If the central-station industry continues to put forth its best efforts, it will continue to show good results. It cannot overcome in a moment the effect of the still cautionary banking control which restricts security markets. It can maintain its present encouraging record of gross and net earnings. It can build up new business by determined effort. It can obtain new customers to replace those whose consumption is lessened. It can study more effectively than ever before new avenues for application of energy in each community. Best of all, it can still be, what it has proved itself many times fitted to be, the optimist industry.

Parallel Operation of Transformers

It is well known that when direct-current shunt generators are operated in parallel between the same busbars at equal internally generated emf the share of the load which each generator will automatically acquire is the ratio of its conductance to the sum of all the generator armature-circuit conductances. This is the same ratio as though the generators were devoid of emf but were supplied with current collectively from a separate source. Each generator armature circuit would give passage to a share of the current determined by the above ratio.

When a plurality of transformers operate in parallel on the same primary and secondary busbars the actions are at first sight confused by the magnetic interlinking between the primary and secondary mains. But if the secondary circuit is reduced arithmetically to its equivalent energy-consuming circuit at primary pressure, thereby changing the transformer in imagination from a step-down to a level transformer, it is known that the primary and reduced secondary circuits, now at equal pressure, may be connected conductively through the total impedance of the transformer windings, thus making a simple conductive system. A plurality of transformers in parallel become a group of equivalent reactors or impedance coils connected in parallel between the primary and the leveled-up secondary mains. The share of the current supplied through each transformer is the ratio of its conductance to the total conductance of the group, except that current, power and conductance must all be interpreted vectorially or worked out by means of two-dimensional arithmetic.

The application of some of the above principles is illustrated in an article by Mr. Richard C. Powell, on another page of this issue, on the parallel operation of subway transformers. When such transformers are operated together in parallel they divide the load in the proportions of individual admittances to the total admittance of the group. If the reactance factors, or ratio of reactance to resistance, of all the individuals in the group are the same or—to express the same idea in other terms—if the impedances of the equivalent transformer reactance coils have the same argument or angle, then the ratios of single to total admittances will be identical with the ratios of single to total conductances, just as in the direct-current case; but if, as commonly happens when the banked transformers have different sizes, their reactive factors are different, the ratios of

single to sum-total admittances may differ considerably from the corresponding ratios of mere conductances, and the transformers may not share the loads in equitable proportions. It is pointed out in the article that in the case of two transformers whose reactive factors differ considerably the disparity in load sharing may be practically serious. It may even be desirable to insert reactance artificially in the circuit of one transformer in order to bring about a better load distribution, lest either excessive heating or excessive plant installation be involved.

The Electric Vehicle Abroad

In his paper presented at the Philadelphia convention of the Electric Vehicle Association, Mr. P. D. Wagoner showed quite clearly that our foreign friends, who were early in the electric-vehicle field, have exhibited commendable activity in invention. However, a canvass of all Europe indicates that only a few more than 3000 electric vehicles are in use there, and hence little need be said regarding the actual results obtained. This state of affairs is rather extraordinary, since the electric road vehicle had its origin in France, like the storage battery, and the French automobile makers have been for years in the front rank of progress. Adding to this the facts that gasoline is considerably more expensive abroad than here and that the roads are on the average much better, it is altogether extraordinary that progress has not been more rapid.

In this country the central stations have not been sufficiently awakened to a sense of their responsibility in the matter of charging stations. The trouble with the electric-vehicle business here resides chiefly in the inconvenience and difficulty of obtaining a recharge when necessary, and the electric-vehicle business will expand just in proportion as provisions for recharging are multiplied. The electric trucks and delivery wagons in particular are vastly more prominent in American practice than in Europe, which again may be in part accounted for by the fact that such vehicles are essentially those for city and suburban use, where no considerable radius from a convenient charging station has to be covered. In fact, the enterprising company which owns a considerable fleet of electric delivery wagons is quite certain to have its own charging station and organized repair staff, so that the vehicles will always be in condition. With respect to electric trucks, experience abroad seems to confirm experience here in showing a very good degree of economy. As compared with gasoline-vehicle practice the electric vehicle is nearly always much under-powered. It can go onto low speed and climb a hill if necessary, but there is no temptation for the driver of an electric truck to try scorching up a hill or, having delivered his load, to go on a wild "joy" ride back to the store. His facilities for scorching are very limited, although he has ample power to do the legitimate work for which the truck was designed. This fact alone is enough to give the electric vehicle the advantage in cost of operation if other conditions are anywhere nearly equal. Nor is there any waste of energy by an electric delivery wagon when stopping to make deliveries, while with a gasoline vehicle the engine is kept running at considerable cost for fuel and repairs. These humble but practical virtues of the electric system of driving make for success, and it is not surprising to learn that the use of electric vehicles abroad, while still limited, was decidedly on the increase up to the time of the beginning of the war. We are rather inclined to think that since then the advantages of the electric vehicle have become in places very manifest, since it is about the only type which has not been commandeered for military purposes or, if not actually seized, deprived of its motive power by lack of fuel.

Seat of Light Action in Selenium

Selenium is a remarkable substance from an electrical point of view. It was first obtained in 1817 by Berzelius. It exhibits two modifications, like sulphur—one amorphous and insoluble in carbon disulphide, the other crystalline and slightly soluble therein. The two modifications bear interesting physicochemical analogies to those of sulphur; but whereas sulphur, so far as is known, is always an insulator, selenium has a very appreciable electric conductivity which is affected by incident radiant energy within the limits of the visible spectrum, that is, by light.

Some experiments on selenium and deductions therefrom have recently been published in the *Philosophical Magazine* by Drs. F. C. Brown and L. P. Sieg, which, if they are corroborated, indicate that selenium possesses the power not only of responding electro-conductively to light at the point of incidence but also of transmitting that response to short distances beyond the point of incidence. If we grant the proposition that the electric conductivity of a plate of selenium is improved by illumination, we should naturally expect that if the plate is kept dark except at a single point where a beam of light falls, the conductivity of the plate would be modified only at this point and the rest of the plate would remain unaffected. Of course, if the action were thermal, we might expect to see it transferred from the illuminated spot to the outlying dark regions, in the slower and definite manner of heat conduction. The authors state, however, that in cases examined the change of conductivity was transmitted from the illuminated point to the outlying dark regions at a speed greater than could be accounted for by thermal conduction. It is claimed that this peculiar propagation of increased electric conductivity along the substance of a selenium crystal from the point where light falls to outlying dark regions indicates a new property of matter, not accounted for by acknowledged physical principles. If so, it is very important to clear up this action by experimental investigation. We know something about the conduction of mechanical stresses in matter, of electrons and electrical stresses, of chemical action, of heat, and of nervous stimuli in living organisms. Is it possible that the conduction of electric conductivity in selenium belongs to none of these modes of propagation?

The News of the Week

**Activities and Events in the Electrical Field—
Reports of Meetings—Commission Findings, Etc.**

Engineers to Determine Franchise Value

The Board of Estimate and Apportionment of New York City has authorized Mayor Mitchel to appoint engineers to determine the value of a franchise which the New York Edison Company asked to construct a transmission line along the Catskill Aqueduct. Two engineers in city departments and one outside engineer will be appointed. The company proposes to give energy for siphon service in return for the franchise.

Electrical Manufacturers' Club

At the meeting of the Electrical Manufacturers' Club scheduled to be held at the Homestead, Hot Springs, Va., Nov. 4 to 7, as already announced in these columns, the program included addresses to be made by the Hon. Joseph E. Davies, Commissioner of Corporations, United States Department of Commerce, Washington, D. C., and by Mr. W. S. Kies, of the National City Bank, New York City. Mr. S. O. Richardson, Jr., Toledo, Ohio, is president of the club.

Sale of Athens (Ohio) Municipal Electric Plant

The village of Athens, Ohio, has sold its municipal electric-light plant to the Hocking Power Company, of Nelsonville, Ohio, for $15,000. A twenty-five-year franchise was granted to the company. The franchise provides for the following schedule: Residence lighting, 7 cents per kw-hr., with a discount of 5 per cent for prompt payment and a minimum monthly charge of 50 cents; commercial, 6 cents with 5 per cent discount and additional quantity discount; other commercial energy, 4 cents to 1 cent; wholesale energy, from less than 1 cent to 3 cents; street lighting (all night, 365 days per year), 80 cp, $20 per year; 100 cp, $25 per year; 250 cp, $50 per year.

N. E. L. A. Educational Committees

Mr. John F. Gilchrist as chairman of the National Electric Light Association committee on relations with educational institutions has appointed sub-committees with the following chairmen: Committee on lectures, Prof. H. E. Clifford; committee on courses and curricula, Prof. C. F. Harding; committee on employment of graduates and undergraduates, Prof. George D. Shepardson; committee on supplying information to economic departments, Prof. C. F. Scott.

The committee on lectures will probably arrange for a certain number of lectures to be given during the year by men in the electrical business before the student bodies of the colleges, and by members of the faculties of the colleges before sections of the N. E. L. A. The committee on employment of graduates and undergraduates will work out a plan under which central stations will avail themselves of the services of students during periods of vacation or after graduation. The committee on courses and curricula will determine for the benefit of students who expect to make public utility work their lifework what training is particularly desirable. The committee on supplying information to economic departments will take charge of disseminating the important literature of the central-station industry and important information in the economic departments of all of the colleges, so that those departments may be posted in the most recent practice of utility companies.

Society for Electrical Development Adopts Membership Employee Button

To stimulate co-operative good fellowship and as a ready means of recognition of this affiliation both on the part of the member and the general public, the Society for Electrical Development, Inc., has brought out a membership employee button. The button, which may be mounted as a vest pin or stickpin or used in the coat lapel, is of blue and white enamel on gold plate, and is ⅝ in. in diameter. The cost postpaid is $1, and the button is available for executives, salesmen, clerks and other responsible employees of members of the society.

Mr. Burdett Advocates Electric Refrigeration

The special commission named by the Massachusetts Legislature to investigate the question of placing the ice business under state regulation and the expediency of permitting electric-service companies to undertake this business heard at Boston on Nov. 4 Mr. Everett W. Burdett, counsel for the Massachusetts Electric Lighting Association. Mr. Burdett opposed the authorization of ice-making and merchandising by local central stations, pointing out that success in this field has been confined to small municipalities in the South and West where the combined business can be handled under a single management. The off-peak, low-rate possibilities of electric service in the field of private refrigeration were pointed out by the speaker, who also urged the large number of ice harvesters and dealers present to investigate the economies of artificial ice manufacture on a large scale by the use of purchased energy. He predicted that unless the ice industry takes early opportunity to study the possibilities of electric service for wholesale production its commercial success, in face of the growing public demand for artificial ice, may be jeopardized.

Jovians' Plan for Higher Individual Efficiency

Within the next sixty days the commercial division of the Jovian Order plans to inaugurate a movement to increase the efficiency of every individual in the electrical industry. The campaign will be propagated somewhat along the lines of the "Safety first" movement, the slogan being "Efficiency wins." This slogan will be printed on thousands of cards and signs suitable for hanging in offices and for outdoor use. Besides the printing and distribution of these signs the plan includes the publication of hundreds of thousands of single-sheets, pamphlets and envelope-stuffers bearing

pithy, hard-hitting arguments on the value of efficiency as the road to personal advancement. Thousands of picture stamps bearing the slogan of the movement and a word or two that carries a "punch" will be used as stickers for envelopes and letters. The plan also includes efficiency talks before Jovian leagues and articles in the daily and electrical press, as well as papers from men who have achieved acknowledged success, not only in every branch of the electrical industry, but in each department of every branch. Large quantities of these papers will be printed in pamphlet form and will be placed at the disposal of the employers of the industry for distribution among employees. On the whole, it is expected that the campaign will induce electrical workers to think of efficiency as often as they now think of safety.

Electric Automobile Salon at Boston

The second annual electric automobile salon at Boston, Mass., was opened in the ballroom of the Copley-Plaza Hotel on Nov. 2 under the auspices of the Electric Motor Car Club of Boston. This distinctive event, which President L. D. Gibbs of the club declared to be the only salon of its kind known in the world, was attended by a representative number of leaders in the social and professional circles of Greater Boston. At the formal opening, which occurred on Monday evening, Mr. Gibbs referred appreciatively to the growth of the electric passenger and commercial vehicle, emphasizing the economic possibilities of the latter and sketching the attractive features of the modern private passenger car when electrically operated.

The increase in the use of electric pleasure cars, and indeed of electric commercial cars, in the Greater Boston territory, said the speaker, has not been sporadic; it never will be. But it will be as certainly continuous as will be the steadily increasing commercial, industrial and social advancement in this part of the country. Economy in commercial operation has been the first consideration and may be credited with 80 out of 100 possible points for the electric vehicle, so as business has grown the use of the electric truck has grown. Growing business almost uniformly means—at least in careful New England—growing profits, increased resources from which to achieve improvement in domestic and social life. Here the electric pleasure automobile has entered the field. It may be a peculiar comparison, but the man who sees his electric truck going about its work with steadiness and efficient sobriety is most likely to appreciate what a similar mechanism will do under his pleasure car. We have passed through our attack of speed mania, the speaker went on to say; it was as catching as measles. For a long time few ever thought of purchasing a car without a guarantee of at least 60 miles an hour. There was a time when bicycles geared to at least 60 were in demand, but when it was found that high gears, although conducive to high speed, were equally conducive to leg-ache and heart trouble the public became more reasonable. Dangerous possibilities of high speed in the hands of inexperienced and irresponsible persons have handicapped, if not the manufacture, at least the enjoyment of automobiles.

More than 16,000 complimentary cards of admission were sent by the club and by Boston representatives of the manufacturers of passenger cars and accessories to selected persons within a radius of 40 miles from Boston, and attractive posters were distributed in the leading hotels, clubs and prominent business houses. The suburban electric railway cars carried dasher signs calling attention to the salon. As was the case last year, any orders taken by the exhibitors were voluntarily offered by the purchasers, the soliciting of patronage at the salon being forbidden.

A pleasurable feature of the salon was an arrangement for exhibition and general dancing in the small ballroom adjoining the large one. The salon was under the management of Mr. C. H. Miles, of the Edison Electric Illuminating Company of Boston, and was open from 10 a. m. to 11 p. m. daily from Monday to Friday inclusive.

Depreciation and Rates Discussed Before American Gas Institute

Among the many papers which were presented at the annual meeting of the American Gas Institute held in New York recently were several of particular interest to the electrical industry. The text of these papers, abstracts of which are published herewith, is subject to final revision for publication in the Gas Institute *Proceedings*. Mr. Halford Erickson, Railroad Commission of Wisconsin, presented a paper on "Depreciation Problems." Dr. A. C. Humphreys, president Stevens Institute of Technology, read a paper on "In Rate-Fixing by Commission Should 'Depreciation' Be Deducted from Plant Valuation?" A report was presented by the committee on rates which recommended the establishment of a permanent standing committee to deal with this subject. On hearing the report the meeting recommended the creation of the committee, and the matter now goes to the board of directors for definite final action. The members of the committee that presented the report on this subject are Dr. William McClellan, chairman; Messrs. A. E. Forstall, R. G. Griswold, C. N. Jelliffe and A. S. Miller.

Mr. Erickson on Depreciation

In his paper Mr. Erickson dealt mostly with the financing and the accountancy of depreciation and with certain questions that are involved in distinguishing between depreciation and ordinary repairs.

There is still considerable dispute as to how depreciation should be measured or determined, said Mr. Erickson. Some depend on life tables of such property as that involved; others again upon their own judgment in the matter, based on the inspection of the property and the operating and other local conditions. Both methods are important. Life tables properly kept, classified and used throw a great deal of light upon the question. This may also be said of personal inspections of the property and the conditions by which its life is affected. Especially is this true when the inspections are made by competent parties. The best and most satisfactory way, however, is to use both methods.

Only in exceptional cases, such as the destruction of property due to unforeseen and undeserved calamities or causes, and under highly abnormal conditions in certain other respects, is it justifiable to charge renewals or replacements to capital. In order to prevent serious fluctuations in the operating expenses and in the net earnings it is best to provide for depreciation in advance through regular annual charges against earnings; the charges are adjusted as closely as possible to the rate at which depreciation is accrued. Larger plants, such as railways, are often in position to adjust their renewals so that the cost remains fairly constant from year to year. In such cases it may not be necessary to provide for depreciation in advance, since the cost of the renewals can then be charged directly to operating expenses. Under this practice, however, there is often a great deal of accrued depreciation that is not offset by assets in other forms. Without reserves of some sort the investment cannot be kept intact.

That depreciation in a broad sense includes repairs is

evidenced by the fact that it is the purpose of depreciation to keep the cost of the property intact. For it is obvious that the integrity of the investment cannot be maintained through depreciation allowances alone unless these allowances are also large enough to cover such losses as those which are made up by repairs. While it is suggested herein that depreciation and repairs should be kept apart, these suggestions do not mean that it is believed that these items cannot possibly be properly dealt with if combined into one. On the contrary, such combinations might be practicable not only in the provisions that are made for these costs, but also in the expenditure of these provisions.

Nevertheless, there are certain advantages in keeping depreciation and repairs apart that should not be overlooked, said Mr. Erickson. Such practice seems to be more natural and therefore more easily understood. It would seem to enable closer estimates of the respective cost of these items than can be had in any other way. It tends to facilitate the closest practicable adjustment between the depreciation that has taken place in the property and the reservations made to offset such depreciation.

Paper of Dr. Humphreys

Dr. Humphreys said that, apart from the method pursued as to the making of the estimate and the accuracy of the estimate, however prepared, depreciation, meaning the accrued liability for the deferred or periodic renewals of plant, should not be deducted from the valuation of the plant. In opposing deduction from plant valuation for depreciation it is assumed that the plant is maintained through current expenditures for repairs and renewals in a condition to render to the ratepayer effective and economical service; that the cost of deferred or periodic renewals is included in the cost of service and that, therefore, the public service corporation can be held liable for such renewals when necessary and that depreciation so defined is not the reduction in worth or value as viewed by a possible purchaser but is the accrued liability of the owner to renew all parts of plant as these parts become uneconomical or inefficient for operation because of physical decay, obsolescence or inadequacy.

Dr. Humphreys added: "If we who are trying to protect honest investments in public utility properties—properties which have been efficiently maintained by well-advised expenditures from income for repairs and renewals—had to contend only with the views of the 'experts' who are retained and paid to depreciate the value of such investments, our task would be far less difficult to meet than is the fact. Unfortunately, the representatives of the public service corporations are not infrequently led astray on this question. Some are misled by their failure to differentiate between actual depreciation and the accrued and accruing liability for renewals in prospect. Others are not so misled but weakly argue that, as the commissions and courts take the position that depreciation should be deducted, they might as well conform to this position. Not only is this not honest to the public service corporations but it is not honest to the commissions and courts, for the honest members of these bodies have the right to look to us to educate them in matters more particularly pertaining to our profession."

An earnest protest was entered by Dr. Humphreys against the methods "pursued by not a few 'valuation engineers'; namely, in following, more or less blindly, tables of average lives for the several types and parts of plant. When we reflect that these tables, if founded upon actual facts at all, are the result of averaging widely differing data, we should be able to see that no such average is applicable to a specific case, though it might be of value in connection with generalizations. The fact is, I presume, that these tables are, as a rule, not the average of actual results, though they may be the average of differing opinions."

Report of Committee on Rates

The committee recommended the establishment of a permanent committee on rates for the following reasons:

"(1) In these days of increasing operating expenses and constantly lowering selling prices of gas it becomes important that every consumer pay as large a part as possible of the cost of giving him the product and service. (2) It is of the utmost importance that a schedule of rates be used which will induce the greatest possible use of gas. This means that if a consumer, by his use, can earn a lower rate, this will induce him to increase his use. (3) It is desirable to know definitely where and to what extent discrimination, if any, exists, and how best to eliminate it. (4) Commissions are considering these questions, and it is desirable for companies to be well informed in regard to them. (5) Should it become desirable to introduce gas rates other than flat rates, a preliminary period of investigation, education and discussion is necessary to facilitate changes. (6) Should a company see the desirability of a new kind of rate, and very reasonably lack the courage to make the change on account of the delicate relation usually existing between the company and its public, it would be strengthened greatly in its determination by the work and assistance of such a committee."

CONVENTION OF KANSAS UTILITY MEN

Kansas Gas, Water, Electric Light and Street Railway Association Discusses Service Costs, Rates, Rural Distribution and Electric Merchandising

The seventeenth annual convention of the Kansas Gas, Water, Electric Light and Street Railway Association was held at Arkansas City, Kan., Oct. 22, 23 and 24. Most of the morning and afternoon of the first day were given over to registration and to a picture-show session at which films prepared for electrical manufacturers and for the Electric Vehicle Association of America were shown. An illustrated paper on high-efficiency lamps, by Mr. R. S. Obermeyer, Kansas City, Mo., was also read at this meeting.

At an evening meeting called so that more time might be given to papers Mr. M. T. Flynn outlined in detail the office-record system of the Standard Electric Light Company, Kansas City, Kan. In the discussion of this paper both Mr. E. A. Wright, Manhattan, and Mr. W. H. Fellows, Leavenworth, stated that all record keeping in the companies with which they were connected was accomplished by three clerks. The Manhattan company has 2200 accounts and the Leavenworth company has 7000 accounts. Others who spoke were Messrs. A. L. Newman, Arkansas City; J. R. Murphy, Great Bend, and L. K. Green, Concordia.

Cost of Distribution and Overhead Charges

Ignoring the production cost of electrical energy, said Mr. E. A. Wright, of the Manhattan Ice, Light & Power Company, the costs of serving the company's various classes of business during the last fiscal year were: Residence lighting, 8.95 cents per kw-hr.; business lighting, 5.15 cents per kw-hr.; street lighting, 2.45 cents per kw-hr., and motor service, 0.221 cent per kw-hr. Adding production cost at 2 cents per kw-hr., it is seen that the actual cost of serving these patrons ranged from 10.95 cents per kw-hr. for residence lighting to 2.221 cents per kw-hr. for motor serv-

ice. These data were secured by apportioning the fixed charges and operating expense among the various classes of customers and assuming distribution losses, except in the case of street lighting, as being 20 per cent of the energy delivered to the customers. The plant from which the figures were compiled serves a population of 7800 people, not including 2500 student residents who are in the city nine months of the year. During the year the company had an average of 1472 electric meters on its lines, serving forty-one motor-service customers, 252 business-lighting patrons, 1179 residences and the municipal street lighting.

Discussion which followed the paper showed that some thought 20 per cent distribution losses too low an assumption, but Mr. J. R. Murphy, Great Bend, said that with a 41 per cent load-factor his plant had shown 22.5 per cent and 18.5 per cent distribution losses for the last two years. Others who spoke were Messrs. C. G. Lafite, Eureka, and W. R. Waggoner, Salina.

Following this technical paper and discussion, the meeting was enlivened by a paper entitled "Has Business a Humorous Side?" by Mr. L. O. Ripley, Wichita.

Electric Service for the Farmer

Mr. C. L. Brown, Abilene, in a paper on rural electric service declared that the telephone and the magneto on the farmer's automobile have created a demand for farm lighting and motor service. In most cases the farmer is willing to pay well for the service as he balances the cost of electric service against the cost of acetylene or gasoline-engine lighting plant. The Riverside Light & Power Company, of which Mr. Brown is secretary, now has twenty-seven rural customers, from whom it derives an average monthly revenue of $4.18. Some of these customers are served from iron-wire circuits operating at 2300 volts.

In the discussion of the paper it was shown that Kansas farmers are paying as much as $350 for their share in electric-service lines, and the minimum bill demanded by the companies ranges from $1.50 to $5. Construction practice varies in the different communities, some operators favoring iron, some copper-coated and others copper wire. Those who participated in the discussion were Messrs. A. L. Newman, Arkansas City; J. R. Murphy, Great Bend; M. T. Flynn, Kansas City; W. H. Fellows, Leavenworth; L. K. Green, Concordia; T. Harvey, Wichita; L. C. Spake, Chicago; D. Holman, Larned, and C. G. Lafite, Eureka.

A paper of particular interest to the gas and water utility operators presented by Mr. N. R. Waggoner, Salina, described practical methods of making electrolysis tests and of providing remedies for electrolytic troubles. Insulating pitch coverings for all pipes and insulating joints at 500-ft. intervals were favored by the speaker.

Mr. C. L. Draper, Kansas City, Mo., read a short paper pointing out the value of electrical information gathered by manufacturers and distributed among the central stations to help in developing electric-service business.

Papers on Rates and Finance

In a paper entitled "Rate Making" Prof. George Shadd, Lawrence, expressed his belief that rates ought to be made so that they would automatically aid in the development of off-peak business. He declared further that in estimating plant valuation cognizance should be taken of intangible or going value as well as the physical value of the property, and a fair return should be made to accrue to the company over and above all operating expenses, depreciation and interest necessary to attract capital. Too often rates are based on some schedule which has proved satisfactory in some nearby town or on guesswork which is sometimes termed "experience" by the rate makers. The logical basis for rates, concluded the speaker, is plant data, estimated for a new plant or taken from the records of a going concern.

The consensus of opinion of those who discussed this paper indicated that rates of some Kansas plants ought to be revised on this scientific basis.

"When Bonds Come Due" was the title of a paper by Mr. H. P. Wright, Kansas City, Mo. Any company that increases its gross business 15 per cent a year, said the speaker, will soon become insolvent unless it has facilities for financing other than its net receipts. For this reason it is impracticable for a growing central station to try to set aside a heavy sinking fund. The modern and safe method of meeting bond debts is to build up a credit upon which new capital can be borrowed to meet bond payments and to carry on necessary construction. It is now an established principle, said Mr. Wright, that utilities will be permanently financed on borrowed capital and amortization will not be resorted to. In closing, Mr. Wright advised that all refunding bonds should include a clause providing for adequate maintenance of the property.

Another paper on rates by Mr. J. R. Murphy, Great Bend, reviewed the existing electric-service rate situation in Kansas, showing that in general rates in that state are netting the companies earnings which are very near those in neighboring states. Mr. Murphy advised as a business expedient that existing rates for business lighting might be reduced to compete with gas and rates for outline and window lighting where there is no gas competition might be increased if necessary, as these loads occur at about the same time and have the same effect in increasing station peak loads.

Effect of Washing Kansas Coal

Describing the effects produced by washing three carloads of Kansas coal to be used under boilers, Prof. A. A. Potter, Manhattan, said that the effect of washing on boiler operation was that the total amount of ashes handled with washed coal was 22.7 per cent less than with unwashed coal. As a result of the better fuel resulting, evaporation of the boiler in pounds of steam per hour from and at 212 deg. Fahr. was increased 23.6 per cent, evaporation of the boiler per square foot of heating surface was increased about 20 per cent, horse-power rating of the boiler was increased 20 per cent, and the total efficiency of the boiler, furnace and grates was increased 10.7 per cent. Professor Potter also stated that about 17 per cent of the coal was eliminated in washing but that this residue was used in a gas producer and did not represent a total loss.

Those speaking in the discussion of the paper were Messrs. H. W. Magruder, Liberal; V. A. Crawford, Pittsburgh, Pa., and P. J. Walker, Lawrence.

Choosing the title "Co-operation" for his paper, Mr. H. W. Magruder, Liberal, divided the subject into three parts. Collectively, said he, the central-station companies can do and ought to do much to better the utility laws of the State and give publicity to the facts concerning operation of both private and municipally owned utilities. Individually each company ought to refrain from making any statements tending to create unfavorable public sentiment against its neighbor corporation. Within its own organization each company should strive for harmony and co-operation among its staff and employees.

Is the Supply Jobber a Nuisance?

Defending the electrical supply jobber as a necessity instead of a nuisance, Mr. F. B. Uhrig, Kansas City, Mo., declared that the district branch of the Western Electric Company in Kansas City carried 8700 different kinds of apparatus and supplies in stock. These goods

are made by 140 different manufacturers, and the interposition of a jobbing house between these manufacturers and the central-station buyers enables the latter to receive shipments over night which otherwise could not be obtained in a week. Hence the jobber's readiness to serve gives him a real place in the industry. As indicative of the character of jobbers' business, Mr. Uhrig cited the fact that the average order of electrical jobbing houses in the United States amounts to but $20.

Mr. L. O. Ripley, Wichita, in discussing the paper said that purchasing departments of central stations were beginning to realize that by dealing with the jobber and buying in small shipments money can be saved.

What One Horse-Power Means to the Industries

Prof. B. F. Walker, Lawrence, in a thoughtful paper showing how much increase in value is given to material by processes of manufacture, quoted statistics from forty-five industries. In these forty-five various and common industries of the United States an average increased value of $777 per horse-power utilized is given to the material by manufacture. This added value in each instance, declared the speaker, is an indication as to the amount a particular industry can pay for its power.

PRESIDENT-ELECT H. W. MAGRUDER

Reading a paper on "The Central Station and the Electric Meter," Prof. C. F. Reid, Manhattan, maintained that the customer's meter is one of the most important parts of the electric-service company's system. An error in a customer's meter makes itself felt in direct proportion on the company's cash book, while a few per cent saving in fuel, for which all are striving, has only a minor effect. For this reason more attention should be paid to testing meters and keeping them constantly corrected. Following these assertions, Mr. Reid discussed the elements of meter testing in detail.

The Next Convention and the New Officers

Adopting the report of the time and place committee, the delegates decided that the next convention will be held at Topeka on Oct. 21, 22 and 23, 1915. The election of officers resulted as follows: President, Mr. H. W. Magruder, Liberal; vice-presidents, Messrs. W. R. Murrow of Independence, N. R. Waggoner of Salina, Otto Thies of Dodge City, and E. A. Wright of Manhattan; executive committee, Messrs. C. L. Brown of Abilene, T. B. Cole of Pittsburg, A. M. Patton of Topeka, S. M. Brockway of Olathe, and F. G. Haskins of Pratt.

The president-elect, Mr. H. W. Magruder, was born at Edina, Mo., in 1880 and received his education in the schools of Pratt, Kan. In early manhood he entered the government railway mail service and later financed the electric plant at Liberal and was made president of the new company, the Liberal Light, Ice & Power Company. Through the seven successful years which have ensued since the building of the Liberal plant Mr. Magruder has held this position.

Entertainment

Among the entertainment features which helped to enliven the convention were an automobile trip to the United States Indian Industrial School at Chilocco, Okla., returning through a newly developed gas and oil field in Kansas, a Jovian rejuvenation and a dance. The twenty-four candidates initiated into the Jovian Order are said to be the first to enter under the thirteenth administration.

RAILWAY ELECTRICAL ENGINEERS

Car-Lighting Men Meet in Seventh Annual Convention—Over Half the Cars in Use on Principal American Railroads Now Electrically Lighted

The seventh annual convention of the Association of Railway Electrical Engineers opened at the Hotel LaSalle, Chicago, Monday evening, Oct. 26, with a reception and dance in the "blue room" of the hotel. At the same time the exhibits made by manufacturers and others, which occupied both the great ballroom and the "red room" on the nineteenth floor, were thrown open for the inspection of the early arrivals. Thirty-five associate members of the association made displays. These exhibits included all kinds of car-lighting equipment, lamps, generators and batteries, as well as apparatus for motor drive in railroad shops, shop-lighting fixtures and equipment for electric service in and illumination of railroad yards, stations, terminals and rights-of-way.

Association Growth and Membership

On Tuesday morning the first regular session was opened by President C. R. Gilman, Chicago, Milwaukee & St. Paul Railroad, with the reading of his address. Reviewing the early rapid growth of the car-lighting engineers' body and its later conservative and substantial development, President Gilman referred with pride to the work accomplished by the organization since it was formed six years ago. He quoted John Stuart Mill on the effectiveness of co-operation, and pointed out that results in any field demand hard work, self-denial and a respectful regard for the opinions of others. Basing the promise of the future of the association upon its past, President Gilman predicted even greater effectiveness of the organization's efforts during the coming year.

The report of the secretary, Mr. Joseph A. Andreucetti, Chicago & Northwestern Railway, revealed a flourishing condition of the association treasury and a membership enrolment as follows: Active senior members, 173; active junior members, 137; associate members, 221.

The committee on loose-leaf binders, through its chairman, Mr. J. R. Sloan, Pennsylvania Railroad, reported the action of the Atlantic City convention in June in adopting the 6-in. by 9-in. size as standard.

19,000 Electrically Lighted Railroad Cars

Topics of car-lighting, shop and station equipment, shop motors, traveling-crane apparatus, etc., were covered in the report of the committee on data and information, of which Mr. Edward Wray, *Railway Electrical Engineer*, Chicago, was chairman. According to the

figures contained in the report, more than one-half of the cars in use by the principal American railroads are now electrically lighted. The number of electrically lighted railroad cars has increased from 11,017 in 1911 to nearly 19,000 in 1914, an increase of about 72 per cent.

Greatest growth has been shown by the straight-storage-battery and axle-generator system, while the number of head-end installations has increased by about one-third the percentage of axle-lighting installations. Nearly 260,000 cells of lead storage battery are now in use in the car-lighting field, compared with 32,000 cells of nickel-iron battery, although the number of cells of the latter has increased nearly six times in the last two years.

Purchase of Central-Station Energy by Railroad Shops

Of the 415 railroad repair shops reported, nearly 200, representing, however, only about one-third of the total power demand, purchase energy from local central stations. The remainder of the energy is generated in private plants operated by the railroad companies. The fifty roads cited employ 184 industrial trucks for baggage handling and 124 other trucks about their freight houses. The 10,000 motors in use in the railroad shops aggregate 190,000 hp, about 35 per cent of which is in direct-current equipment. The three-phase motors make up 50 per cent of the total number and 52 per cent of the total horse-power.

Locomotive Headlamps

At the session of Wednesday morning the committee on electric headlamps, Mr. C. R. Sugg, Atlantic Coast Line, chairman, recommended that headlamp generators be mounted directly in front of the cab, that a standard rating of candle-power and voltage be adopted for the lamps in the cab, that 18-in. by 10.5-in. deep reflectors be employed when rebuilding headlamps, that 1-in. conduit be used instead of the handrail for conveying lamp leads forward, that open wiring be employed in the cab interiors on account of its accessibility for repairs, and that slow-burning weatherproof wire be adopted for locomotive work.

Among those who took part in the discussion were Messrs. G. E. Murray, J. A. Andreucetti, J. E. Gardner, C. R. Gilman, J. B. Cartwright, J. L. Minick, C. W. Bender and W. H. Rolinson. The economies to be derived from standardization were pointed out, although several different ideas were expressed concerning the proper voltage to be adopted. The success of the 6-volt system for automobile lighting was cited as an argument in its favor for locomotive headlamps. Weatherproof wire withstands the heat of the locomotive without "tarring," although objection was raised to open wiring on account of the tendency of everyone to make repairs. State laws concerning headlamps show the widest variety of specifications, some being based on the diameter of the reflector, the watts at the lamp, visibility at a stated distance, etc. Co-ordination of these laws is needed.

Wireless Telephony Between Trains

Dr. Frederick H. Milliner, of the Union Pacific Railroad, Omaha, Neb., traced the history of wireless communication and described his own experiments looking to wireless telephonic communication with moving trains from station points. It is Dr. Milliner's plan to use as "extended aerials" the telegraph wires already in place, insulating them thoroughly and providing condenser shunts for the high-frequency currents around the telegraph keys. The transmitting equipment adopted employs a bank of arcs to produce the high-frequency current. The inventor asserted that a baggage car can be equipped with transmitting equipment for less than $200. Perikon detectors have been used in the receivers experimented with. Already the system has been successfully tried on a section of siding, according to Dr. Milliner.

Industrial Trucks

The report of the committee on industrial trucks was read on Wednesday afternoon by Mr. T. V. Buckwalter, Pennsylvania Railroad, chairman. For general railroad service the committee recommended as standard the 2-ton truck, with an average speed of 5 miles per hour at full load. An alternate speed of 7 miles an hour was suggested for unobstructed runs. Specifications were also proposed, and accepted by the association, for standard tire sizes respectively 10 in., 16 in., 20 in., 22 in. and 27 in. in diameter. For general truck service 24 volts was urged as standard, this pressure to be supplied by twelve cells of lead battery or twenty-one cells of nickel-iron battery. This lower pressure affords more substantial battery construction than is possible at higher voltages where the motors would, on the other hand, have better efficiency. Messrs. W. Gassaway, W. L. Bliss, L. G. Pomeroy, G. E. Murray and D. J. Cartwright took part in the discussion.

Electrification of Railroads

As actually read, the report of the committee on electric traction, Mr. H. M. Van Gelder, New York, chairman, was confined to a description of the several systems of electrification available, together with an enumeration of the principal installations of main-line and terminal service in Europe as well as in the United States. Tunnel electrification was suggested as a means of augmenting train movements over a single-track road, and the advantages of electrifying mountain divisions were described. Electric locomotives can be grouped to form the equivalent of the heaviest steam locomotive, the cost of helper service is reduced, tunnels are made safer, water-power is usually available for operation, forest fires are avoided, and the possibility of dynamic braking reduces wear on the brake equipment.

In making recommendations for energy supply the committee declared that where suitable central-station service is available it will be found more economical and more reliable for the railroad company to purchase its energy supply than to attempt to generate power in its own plant. The road is also in this way spared a large initial investment and the necessity of organizing and equipping a special and separate department.

The 1913 wire specifications of the association were during the year revised by its special committee, Mr. W. A. Del Mar, New York Central Railroad, chairman, to conform to the 1914 standardization rules of the A. I. E. E. and rules and specifications adopted by the wire and cable committee of the American Electric Railway Association. Sample order forms for specifying wire formed the second part of the report. In the description of tests a number of minor modifications were included, based on experience with the previous specifications.

Axle-Lighting Equipment

Mr. H. R. Bucks, chairman, read the report of the committee on axle-lighting equipment at Thursday morning's session. Taking into account certain railroads operating in the northwest section of the United States which favor the head-end system of lighting, 23,477 cars, or 84 per cent of the electrically lighted cars in the United States, Canada and England, are lighted by the axle-generator system. Of the remaining 16 per cent about nine-tenths could be converted to axle-lighting without loss. Data were given in the report con-

cerning operating costs in the United States and England, and particular attention was called to the high cost of maintaining the dynamos as compared with all other parts of the equipment. Battery maintenance, for example, was found to amount to only about one-half that for generators. Summaries of the systems of various manufacturers were also included.

Methods of determining and recording costs were touched on in the discussion. One speaker referred to the use of glass battery jars in Europe and cited a case in which a set of stoneware jars had gone through a derailment on an American road, after which it was carelessly loaded onto a teamster's wagon and returned uninjured to the battery-charging terminal. The need for standardization of truck dimensions was also discussed. Among those who spoke in the discussion were Messrs. D. J. Cartwright, L. J. Pomeroy, George B. Colegrove, L. S. Billau, E. J. Kelley and W. L. Bliss.

Axle-Driven Generator in Baggage Car

Mr. K. R. Hare, chief electrician of the Northern Pacific Railroad, described the system of head-end lighting from an axle-driven generator mounted in the baggage car, which has been developed by the Northern Pacific Railroad. Experiments in this direction began in 1909, and the latest type of unit, installed this year, comprises a 20-kw, six-pole, commutating-pole, compound-wound, 80-volt Gould generator which runs at speeds of from 300 r.p.m. to 2100 r.p.m. A Morse silent chain drives the generator from a counter-shaft. This outfit has already run 40,000 miles without a failure. The maximum lamp load is 100 amp and the generator is in operation about 80 per cent of the time. Cells of battery are placed beneath the postal car, the dynamo car, the sleepers and the observation car. The head-end axle-lighting system presents a number of advantages, including the absence of excessive heat in the baggage or express car and the avoidance of terminal charging.

Messrs. G. S. Anderson, E. S. M. MacNab, J. E. Gardner, W. H. Keirn, T. V. Buckwalter, H. R. Bucks, J. R. Sloan, S. W. Everett, L. S. Billau, L. J. Pomeroy and W. L. Bliss took part in the discussion.

Rules for Car Wiring

The report of the committee on standard rules for car wiring included specifications for complete car-wiring systems to conform with the Underwriters' rules. The chairman, Mr. S. W. Everett, Atchison, Topeka & Santa Fé Railroad, pointed out that care must be taken to correct the inference previously given that the association approves only the hot-galvanizing process. Mr. D. J. Cartwright recommended making 2.5 in. the standard length for fuses.

Outside Construction and Yard Facilities

Mr. J. L. Minick, Pennsylvania Railroad, read the lengthy report of the committee on outside construction and yard lighting, which recommended close adherence to the rules of the National Electrical Code and the standard specifications of the National Electric Light Association for railroad crossings. Dimensions, spacings and lay-out of pole structures were given in detail. For permanent construction concrete poles were proposed. Liberal illumination was recommended at switches, in addition to adequate general lighting for the entire yard. The report concluded with a comparison of the principal arc and incandescent illuminants. Among those who took part in the discussion were Messrs. H. R. Bucks, C. D. Axtell, L. S. Billau, E. W. Jansen, D. J. Cartwright, G. B. Colegrove, E. J. Kelley, D. B. Pastorius and J. L. Ohmans.

The report of the committee on yard facilities for charging storage batteries, Mr. D. B. Pastorius chairman, recommended the provision of duplicate power facilities for charging plants, allowance of rating at least 50 per cent above the peak load of ordinary demand, the use of small motor-generators for rectifying alternating-current service, and the provision of platforms, preferably of concrete, in railroad yards.

Election of Officers

By unanimous vote the following officers were elected for the year: President, Mr. H. C. Meloy, Lake Shore & Michigan Southern Railroad, Cleveland, Ohio; senior vice-president, Mr. E. W. Jansen, Illinois Central Railroad, Chicago, Ill.; junior vice-president, Mr. C. J. Causland, Pennsylvania Lines West, Chicago, Ill.; secretary-treasurer, Mr. Joseph A. Andreucetti, Chicago & Northwestern Railroad, Chicago, Ill. Messrs. L. C. Hensel, Frisco Lines, St. Louis, Mo., and J. L. Minick, Pennsylvania Railroad, Altoona, Pa., were added to the executive committee.

PRESIDENT-ELECT H. C. MELOY

Mr. Harry C. Meloy, the president-elect, is supervisor of electrical appliances for the Lake Shore & Michigan Southern Railway Company, with headquarters at Cleveland, Ohio. Mr. Meloy is forty-nine years of age and began his railroad experience in the mechanical department of the Pennsylvania Railroad at the latter's Altoona shops. Later he was employed by the Union Switch & Signal Company at Swissvale, Pa., and then by the Norfolk & Western Railway, where he first took up electrical work. Returning to the Pennsylvania, Mr. Meloy was soon afterward called to Cleveland, where he became chief electrician at the Collinwood shops of the Lake Shore, in charge of power and train-lighting. Four years ago he was appointed to his present position.

Coincidently with the Association of Railway Electrical Engineers' election, the Railway Electrical Supply Manufacturers' Association held a business meeting on Friday morning and chose officers as follows: President, Mr. W. F. Bauer, Edison Storage Battery Company, Chicago; vice-presidents, Mr. T. Mount, Consolidated Railway Electric Lighting & Manufacturing Company, New York, and Mr. Fred F. Skeel, Crouse-Hinds Company, Chicago; secretary, Mr. J. Scribner, General Electric Company, Chicago; directors, Messrs. A. J. Cole, W. Fawcett, Edward Wray, C. W. Bender and J. Scribner. As the closing entertainment feature of the convention the manufacturers' association on Friday evening tendered the railway electrical engineers a dinner-dance in the great ballroom of the Hotel LaSalle.

The Industry Maintains Its Earning Power

President Scott of the National Electric Light Association Believes that General Average Results Will Continue to Show Increases in Gross and Net Earnings—Mr. S. R. Bertron Says that Earnings Under Present Conditions Justify Belief in Stability of Well-Managed Public Service Corporations

MR. HOLTON H. SCOTT ON CONDITIONS

President of National Electric Light Association Finds that They Are Being Adjusted Rapidly

Mr. Holton H. Scott, president of the National Electric Light Association and general manager of the Doherty Operating Company, expressed encouraging and hopeful views regarding the situation in a talk with a representative of the *Electrical World*.

"Our operations extend over sections in all parts of the United States except the Pacific Coast, and we try to keep closely in touch with general business conditions in the communities which our various public utility companies serve," Mr. Scott said. "The cities in the Southern States dependent upon the cotton industry undoubtedly feel the direct effects of the present conditions more than any other part of the United States with the possible exception of the districts dependent upon the oil market.

"The oil market conditions have materially improved during the past thirty days, and although prices are still far below normal, the pipe-line companies are now marketing a considerable portion of the production. With the beginning of the shipment of cotton general business conditions are bound to improve in the Southern States.

"I have just returned from a trip to Oklahoma and Kansas and other Middle Western States. Except in certain parts of Oklahoma directly affected by the oil market, I found things normal. In fact, Kansas and the other largely agricultural States seem to be very prosperous and the people are decidedly optimistic.

"In Ohio we operate several public utility companies, and in two of the cities—Warren and Massillon—large steel works were under construction when the European war broke out, and notwithstanding this condition work on these new factories has been continued without a break. Many of the manufacturing towns in Ohio are operating, at least up to this date, at their normal capacity. It really does one a lot of good to get away from New York and meet people who still retain their optimism.

"It is idle to say that public utility companies are not affected by the present unprecedented condition, but there are so many fields of endeavor in enlarging the uses of gas and electrical energy that even if the increment of increases is reduced the general average results should continue to show increases in the gross and net earnings. For example, this is a time when many men are thinking of increasing the efficiency of their various manufacturing plants, and this condition makes possible the widening of the field for electrical motor service.

"There has been considerable curtailment by central-station companies in construction items, and the efforts of the managements have been confined to increasing the business without extending the lines and enlarging the power stations. This work will eventually be reflected in renewed prosperity to the whole electrical business, because new uses are being found for the application of electrical energy, and this, of course, means more sales of appliances by manufacturers and jobbers.

"The National Electric Light Association membership represents fully 90 per cent of the gross electrical central-station business of the United States and Canada, and through that membership it is in touch with a very large proportion of the population of those countries. I have had occasion in the last few months to come into contact with many heads of the member companies, and my observation leads me to say that these men are not only not pessimistic but are confident that the present disturbed conditions are being rapidly readjusted."

MR. S. R. BERTRON ON UTILITIES

Gratifying Stability of Their Earnings Under Conditions Caused by the European War

Mr. S. R. Bertron, of Bertron, Griscom & Company, of New York, in speaking of present conditions to a representative of the *Electrical World*, said that the stability in earnings of public utility corporations is a gratifying, although not an unexpected, element in the situation.

"We believe that public service company securities are the best that we can offer to our customers where the companies themselves have good franchises and are well managed," said Mr. Bertron. "They supply public necessities at a minimum cost under special franchise requirements, and every dollar of revenue is received in cash. There is less, if any, shrinkage in income in properties of this character in bad times than in any others that we know. Even under the present depressed conditions the earnings of most electrical central stations and gas companies are ahead of last year, while street railways show only a very small shrinkage from last year, if any, varying from 1 to 4 per cent. Up to the present this year the lighting companies in which we are interested show an average increase in gross over last year of about 6 per cent and the street railways about three-quarters of 1 per cent. The net result is that, instead of showing a normal increase in business, public service companies as a whole show some increase, even though a small one.

"These facts justify our belief in the stability of well-managed public service corporations. The safety of the securities of these companies as investments is more and more apparent, and they will increase in popularity as their advantages are more generally appreciated. At present the average rate of return to investors in public service securities is higher than the soundness of conditions justifies and in time it will approach more nearly to the rate of return on municipal bonds and high-grade railway securities."

Mr. Bertron was asked about the effect of the conditions arising from the European war upon capital expenditures of public service properties.

"The companies which we represent," Mr. Bertron answered, "spend normally about $7,000,000 annually in new capital. On account of the difficulty of raising new capital now, expenditures of this character are being made only in necessary cases. Just when our policy in this respect will change depends upon financial con-

ditions here. It is not necessary to assume, and we do not conclude, that we shall need to wait until the end of the war before undertaking new financing. It is probable that before the war is over financial conditions here will have improved to an extent that will permit the resumption of something like normal extensions.

"As business becomes adjusted to conditions and as the new currency act produces the promised release of a large volume of funds, and as economies of the people generally begin to tell in increased bank balances, the result should produce more comfortable rates for money. I think there are indications now that we are gradually approaching that stage of the situation. The improvement of conditions in the South resulting from the extension of credits now promised by bankers to the cotton growers will be a material factor and a favorable factor throughout the country at large.

"At the same time it should be remembered that a large demand for money will arise when settlement day comes in Europe, when the nations now at war begin to count their losses and to start the necessary work of reconstruction. Except indirectly, in taking back such securities as foreigners may want to sell in order to buy new obligations of their own governments, this country will not need to participate in meeting this demand for funds from abroad, although it may do so in certain instances.

"I should not be surprised if a great number of Europeans should desire to place their funds in a country that is not liable to be at war and should invest here in sufficient volume largely to offset the operations of those who are compelled to liquidate by force of circumstances."

Mr. Bertron was asked how he regarded present conditions as compared with those experienced in 1907.

"As applied to us, they are just about the same as during the panic of 1907," he said, "except that at that time Europe was not involved and we could look to it for aid, and I am not sure but that public service companies are in better shape now for the reason that conditions which preceded the panic of 1907 were very different from the conditions which preceded the outbreak of the war this year. Prior to 1907 general business of this character had been exceedingly active and was so up to the time of the panic, and the companies were expanding in full expectation of a continuance of prosperity and favorable markets for securities, At this time, however, on account of the lessened activity in general business and the depression throughout the country, public service properties were not making normal extensions and improvements at a normal rate. Consequently their construction operations did not have to be curtailed suddenly to as great an extent as was the case seven years ago."

MATTERS IMPORTANT TO EXPORTERS

Mr. Charles S. Powell Suggests that Consuls Be Asked to Furnish Needed Information

Mr. Charles S. Powell, consulting engineer of Cleveland, has written a letter to Secretary of Commerce Redfield calling attention to various matters which are of importance to American exporters. Mr. Powell suggests that definite instructions be given to the various consular agencies to supply at the earliest possible moment reliable and complete information regarding the districts in which they are stationed on the following general lines:

How are foreign goods landed at the port of destination? Is the port dock supplied with cranes? Are there railroad facilities to the dock or landing place? Description of available railroad facilities. If goods are not transported inland by rail, what is the largest package in weight and dimensions that can be conveniently handled and what is the mode of transportation? Give plan of dock at harbor and photograph of landing place with details of equipment used in handling goods. What are governmental requirements regarding size and weight of packages?

Mr. Powell believes that the government is in a position to supply information of this kind better than any other organization.

DANGER OF UNWISE EXPORT CREDITS

Manufacturer Urges Careful Discrimination Between Those Entitled to Credit and Those Who Should Pay Cash

A manufacturer in an interior city writes as follows to the *Electrical World:*

"I should like to take the liberty of suggesting that your publication can do decided good in the electrical field at least and save some manufacturers money.

"Since the war started and newspapers and periodicals began to talk about the possibilities of export in South America the wildest schemes have been suggested. At the present time it is wise to be extremely careful with reference to the extension of credits in every way. A great many people with business in South America are just as good as gold to-day, and there are others who were not good before the war started and are worse off to-day. What I shall be sorry to see is many American manufacturers going into the export field with the expectation of accomplishing a great deal and ending by losing a lot of money and forever after keeping out of the export field.

Wonderful, Satisfactory Business

"It is a wonderful, satisfactory business, but, like everything else, you have got to handle it properly. I think your publication can be of some value in the electrical field by acting as a check on too much enthusiasm and too much confidence in the other man's promise to pay. Of course, on the one hand there are many people who are worth a lot of credit, and those people ought to receive it; but there are other people from whom one wants cash in advance, and there are more of them to-day than there were a month ago.

"I think that many of the electrical manufacturers who have not been exporting can obtain a whole lot of real practical experience by forming in their several towns what might be termed an export committee, under the guidance of some of those manufacturers of other lines who have been exporting; in other words, a sort of a round-table discussion. If some clever salesman drifts in and wants to sell an interest in a trade tour or a card in a consular index, let them follow the policy of deferring the signing on the dotted line until they have had the time and opportunity to take it up at the round-table discussion.

"I, personally, am interested in the development of electrical manufacturers' export trade because I feel that the more South American people become accustomed to dealing with American manufacturers generally and obtain satisfaction, the easier it is for us to sell our own product. We have in our city a lively export committee formed by a representation of several lines of manufacture. We obtain our best results by inviting into that committee everybody who is interested in export, say for lunch once a week or once in two weeks, and the man who is puzzled will usually find some one who can answer his question because he has been through a similar experience."

PUBLIC SERVICE COMMISSION NEWS

California Commission

The Mount Whitney Power & Electric Company, of Visalia, Cal., will apply to the commission for authority to issue $418,000 preferred stock at 90, proceeds to be used in retiring floating debt. This is the third public utility corporation of California to follow the example of the Pacific Gas & Electric Company in issuing preferred stock. The others are the Southern Pacific Milling Company and the Northern California Power Company.

The commission has authorized the Holton Power Company to issue $200,000 of 6 per cent first and refunding mortgage gold bonds at not less than 80. The proceeds are to be used for various additions and betterments. Before the company shall pay any dividends it must authorize out of earnings amortization of the difference between the money received from the bonds and par.

In accordance with the commission's decision in the case brought by the city of Salinas against the Coast Valley Gas & Electric Company, a new schedule of electric-lighting rates went into effect in Salinas on Oct. 6. They provide for the reduction from 10 cents for the first 50 kw-hr. to 8 cents for the first 20 kw-hr., a minimum meter charge of $1 per month and a service charge of $1. The latter charge will be refunded if the consumer remains twelve months at one location.

The Southern Sierras Power Company has requested authority to issue $300,000 first mortgage 6 per cent twenty-five-year gold bonds at not less than 90.

Indiana Commission

The Indianapolis electric situation just now is complex. The Merchants' Heat & Light Company has been successful in obtaining a contract with the city of Indianapolis to light its streets for the next ten years. The Indianapolis Light & Heat Company has had the contract for the last ten years.

Meanwhile, investigations as to rates and service of the companies have been proceeding under the Public Service Commission with complications at almost every step. Suits and petitions have been filed. A decision from the commission relative to rates is expected at any time.

The Merchants' company has surrendered its franchise to the commission, and this week the Indianapolis company surrendered to the commission all franchise privileges it might have relating to rate-making power or service. This surrender was in line with a recent surrender to the commission of the rate-making power by the Citizens' Gas Company, of Indianapolis, when the latter sought to merge with the Indianapolis Gas Company. Certain contractual rights existing in the lighting franchise between the city and the company made it improper to surrender the franchise of the company, its officers believed, and the commission therefore accepted the incomplete surrender offered.

Shortly thereafter the Merchants' company, which has expended $130,000 in extending its equipment to begin operations next April on its street-lighting contract, petitioned the commission for authority to issue bonds to the value of 80 per cent of expenditures for new construction. The commission refused to allow the issue in full, withholding its approval of $28,000 of the amount on the ground that this amount represents duplication of property of the Indianapolis Light & Heat Company. The case was taken to the courts.

New York Commissions

In accordance with an opinion rendered by Commissioner Milo R. Maltbie and adopted by the Public Service Commission, First District, the Northern Union Gas Company and the Central Union Gas Company have been called upon by the commission to discontinue the practice of charging a fee for taking a prepayment meter from a customer's premises and substituting therefor an ordinary black meter. The proceeding was instituted by the commission after the receipt of several complaints from gas consumers. The companies use two types of meters, the ordinary black meter and the prepayment meter. Formerly no charge was made for changing meters, but within the last year the companies have established a charge of $2 for making the change. After hearings Commissioner Maltbie reported to the commission that a consumer of gas in this city who finds a prepayment meter installed in premises to which he has removed may, upon making the deposit required by statute, require the supply company to provide a black meter, and that the supply company has no legal right to make any charge therefor.

Ohio Commission

The tentative plan of uniform accounting for electric utilities prepared for the Public Utilities Commission of Ohio by Messrs. Nau, Rusk & Swearingen, public accountants of Cleveland, has been sent to companies for consideration. The commission called a conference of representatives of utilities which took place in Columbus on Nov. 5. The final hearing will be on or before Dec. 10. Officers of companies were asked to put their criticisms and suggestions in writing and mail them to the commission or Messrs. Nau, Ruck & Swearingen. It was suggested that any additions or amendments be in such language and form as will make possible their incorporation into the text. Reasons for all suggestions, amendments, additions and criticisms were requested. The four divisions of utilities are as follows: Class A, average annual operating revenues exceeding $75,000; class B, average annual operating revenues exceeding $25,000 but not more than $75,000; class C, average annual operating revenues exceeding $5,000 but not more than $25,000; class D, average annual operating revenues of $5,000 or less.

The commission says that all of the accounts included in any scheme of accounts fall primarily into two grand divisions, namely (1) income and profit and loss accounts, (2) balance-sheet accounts. In this system each of these divisions is again subdivided into summary accounts (five in each division). The ten summary accounts are as follows: Income and profit and loss accounts—operating revenues (electric utility only), operation (electric utility only), maintenance (electric utility only), general expenses (electric utility only), miscellaneous revenue and expense (non-operating and sub-utility); balance-sheet accounts—fixed assets, investments and funds, current and nominal assets, liabilities, proprietary interests and income and profit and loss accounts.

Wisconsin Commission

The Sheboygan Gas Light Company has been authorized to issue $50,000 in preferred stock and $300,000 in 5¾ per cent bonds. The funds to be derived from the sale of the stock and bonds, the latter to be sold for not less than 75, are to be used in paying outstanding indebtedness and for needed improvements and extensions.

Upon petition of the city of Grand Rapids, the commission has fixed a price of $72,000 to be paid by the city for the property of the Grand Rapids Electric Company, which the city voted to acquire at a recent election. The present value of the property was given by the commission as $63,500 and the cost of reproduction as $86,000.

Current News Notes

GOVERNMENT RADIO STATION AT SAN DIEGO.—Work on the new government radio station at San Diego, Cal., will be commenced within a week, it is declared. The apparatus will be one of the most powerful in this country, and the station will cost approximately $300,000.

* * *

ROCHESTER (N. Y.) SECTION OF A. I. E. E. TO BE FORMED.—The directorate of the American Institute of Electrical Engineers has authorized the formation of a Rochester (N. Y.) section of this organization. The new section will be the first in western New York State.

* * *

SPECIAL TRAINS TO N. E. L. A. CONVENTION.—At a meeting of the transportation committee of the National Electric Light Association, Mr. G. W. Elliott, chairman, held at the Hotel Sherman, Chicago, Oct. 29, preliminary plans were discussed for the routing of special trains to the convention at San Francisco in June. Itineraries will be arranged to include a number of the principal Western water-power and transmission plants.

* * *

CONFERENCE OF GOVERNORS.—The seventh annual conference of Governors of States will be held in Madison, Wis., from Nov. 10 to Nov. 13. The sessions on Nov. 11 are to be devoted to "State Control of Natural Resources." An address will be made by Governor William Spry of Utah, and the remainder of the sessions on that day will be devoted to general discussion on this topic. On Nov. 14 an adjournment will be taken to the city of Milwaukee, where the delegates will be the guests of various business organizations.

* * *

CONNECTICUT CONTRACTORS FORM ASSOCIATION.—The Electrical Contractors' Association of Connecticut was organized recently at New Haven, and Mr. E. M. Baldwin, of Hartford, was elected president and Mr. G. M. Chapman secretary. Sixty-five contracting firms are at present enrolled as members. The association is affiliated with the national organization. The executive committee is composed of Messrs. John Hotz, Bridgeport; G. M. Chapman, Waterbury; E. B. Wilcox, Meriden; T. A. Stewart, Hartford, and R. W. Hewitt, Torrington.

* * *

REPORTED COST OF ELECTRIFICATION IN CHICAGO.—The report of the Chicago Association of Commerce committee of investigation on smoke abatement and electrification of railway terminals is not ready for final publication, but a newspaper writer says that it is understood that the preliminary report on the cost of making all the necessary changes to substitute electrical operation for steam operation on the railroad terminals of Chicago puts the figure at $29,000,000. There is no official confirmation of this estimate. It is expected that the report will be ready in a month or two. The railroads entering Chicago have financed the committee, and it is reported that the investigation, now under way several years, has cost $400,000.

* * *

THE ACCOMMODATING PROPERTIES OF BAMBOO TELEPHONE POLES.—In a talk on his Philippine experiences given before the Chicago Jovian League, Oct. 5, Mr. J. A. Kick told of the extensive employment of bamboo for structural purposes in the islands, mentioning among other uses its application as a support for telephone wires. Such bamboo telephone poles are climbed with the help of bamboo ladders, but so great is the elasticity of the stalks, said Mr. Kick, that by the time a fair-sized lineman has climbed to the top of a pole he is back again nearly to the ground. On the other hand, the native-wood poles used in heavier line construction in the Philippines are so hard as to defy the spurs of ordinary linemen's climbers. The Filipino workmen climb these poles with their bare legs, but an American lineman requires the aid of a ladder. Even these extremely hard woods are not, however, proof against the ravages of the ants which infest the tropics. In one instance cited by Mr. Kick a large pole on a main street was found to be but a hollow shell, the interior having been totally eaten away by the voracious insects.

* * *

SOCIETY MEETINGS

CONVENTION OF THE DISTRICT HEATING ASSOCIATION.—The 1915 meeting of the National District Heating Association will be held in Chicago from June 1 to 3, with the Hotel Sherman as headquarters. Mr. D. L. Gaskill, Greenville, Ohio, is secretary of the association.

* * *

A. I. E. E. NOVEMBER MEETING.—At a meeting of the American Institute of Electrical Engineers to be held in New York on Nov. 13 two papers will be presented as follows: "Graphic Method for Speed-Time and Distance-Time Curves," by Mr. E. C. Woodruff, and "The Corona Produced by Continuous Potentials," by Mr. Stanley P. Farwell. The first paper relates to a simple method for obtaining speed-time and distance-time curves by means of charts, which avoids the usual step-by-step process with its tedious calculations. The second paper deals with an experimental investigation of the corona around small wires produced by continuous potentials up to 15,000 volts.

* * *

CHICAGO JOVIAN LEAGUE.—Mr. L. G. Shepard, electrical engineer for the Federal Sign System (Electric), addressed the Chicago Jovian League Nov. 2, on the subject of the large motograph electric sign at the head of Michigan Boulevard, Chicago, described in the *Electrical World* of Oct. 17, page 771. Mr. Victor Despard was elected second tribune for Chicago, Mr. Victor Tousley having been previously appointed first tribune. Mr. G. A. Freeman was re-elected secretary-treasurer, and the following board of managers was chosen: Messrs. A. A. Gray, T. G. Grier, Nate Harvey, M. S. Hart, C. R. Kreider and J. G. Wray.

* * *

UTILITY REGULATION DISCUSSED BEFORE CHICAGO ELECTRIC CLUB.—At the meeting of the Electric Club of Chicago on Oct. 29 Mr. Robert M. Feustel, chief engineer of the Illinois Public Utilities Commission, spoke on "Public Utility Service." In referring to the equity of regulation, Mr. Feustel declared that the life of the community depends upon the service of its utility corporations, and added that service can be rendered most economically by monopolies. At least 90 per cent of the rate cases heard by commissions start as service cases, said Mr. Feustel, and he advised managers to give particular attention to the service feature of their work.

* * *

PHILADELPHIA SECTION, I. E. S.—On Nov. 7 at 8 p. m. in the Engineers' Club the Philadelphia Section of the Illuminating Engineering Society will hold a meeting at which Dr. Herbert E. Ives will present a paper entitled "Physical Photometry." The paper will deal with various methods which have been proposed to measure light without calling on the eye to estimate quantitatively. The requirements of a physical photometer in respect to sensibility and response to different colors will be outlined. The various physical photometers, including selenium and the photo-electric cell, will be described. The paper will be illustrated with lantern slides and by experimental demonstrations.

Hydroelectric Development on Bishop Creek, Cal.—IV

Hydraulic and electric features of stations No. 2 and No. 3 of the Nevada-California Power Company—Tailrace water of former discharges directly into intake of latter. By C. O. Poole

STATION No. 2 is placed parallel to the pipe line, and the nozzles of the waterwheels discharge at right angles to the pipe line, about half of this angle being taken up in the waterwheel nozzles, so the extra curvature to complete the angle does not cause any serious loss to the water flow, as the velocities are kept down to 18 ft. per second. Fig. 24 is an elevation. There are three 2000-kw generating units in this power house, with an overload capacity of 25 per cent. All of the electrical apparatus in this station is of Westinghouse make. Two of the units are driven by Pelton wheels, with Pelton governors operating the needles, and the stream deflectors. The control is so arranged that the needle and deflector can be operated with the governor, or the deflector alone can be instantly attached to the governor and the needle regulated and set to any position by hand. The last-named method is made use of at this plant most of the time, as the load is nearly constant, the governing being taken care of at one of the other plants. The third unit is provided with a Doble wheel and an auxiliary type of nozzle. This wheel is controlled by a Lombard-Doble directly connected governor so arranged that when the main needle is closed to any appreciable extent during the cycle of regulation the auxiliary nozzle opens correspondingly and slowly closes by means of a cataract cylinder on the stem of the auxiliary needle. The isochronal movement of the two needles is the means of maintaining almost perfect regulation without serious fluctuations of pressure in the pipe line, and at the same time conserving the water over the cycles of regulation. The impact of the water from the auxiliary nozzle, which is placed directly below the main nozzle, is taken by an ensign vortex baffle-plate, which effectually stills the water and drops it into the tailrace. The elevation of the powerhouse floor is 7018 ft., and the effective head is 875 ft.

There are two 100-kw exciters, one driven by a tangential waterwheel mounted on one end of the shaft and the other provided with a waterwheel and a 150-hp, 2200-volt induction motor, the motor-driven set being used always when the Tirrill regulator is in operation, as neither of the units is provided with waterwheel gov-

FIG. 23—VIEW OF POWER STATION NO. 2, SHOWING PIPE LINE AND OPERATORS' COTTAGES

ernors. The exciters are wound for 120 volts. The generators are wound for 2200 volts, three-phase, sixty cycles, and operate at 300 r.p.m.

The switchboard consists of three generator panels and two exciter panels. All generators are connected to a single set of busbars, through non-automatic switches, and the energy is fed to the transformers through two sets of 750,000-circ. mil cables, carried underground to the transformers installed in a separate building.

Figs. 25 and 26 show the station interior, which, with the transformer house, is built of reinforced concrete, the former being provided with a 20-ton traveling crane. This crane is also used for handling the transformers when necessary, the latter being brought under the crane by means of a transfer truck and track. In the transformer house, which is 50 ft. from the generating station, are placed seven 1000-kw water-cooled transformers, two banks of three each, the seventh transformer being used for a spare. The transformers raise the voltage from 2200 to 55,000 and are connected in star with grounded neutral. The transformers are connected to a common bus on both high-tension and low-tension sides by means of oil switches.

Fig. 23 is a general view of the plant, showing the pipe line and operators' cottages. These cottages are of a standard type. They are of reinforced concrete, contain four rooms and bath, and cost $2,200 each. The crew at this plant consists of one chief operator, two operators, two assistant operators, and one all-around helper. The watches are so arranged that there are always two men on duty. The plant was constructed in 1908 and has been in continuous operation ever since, excepting the twenty days when the steel Y failed.

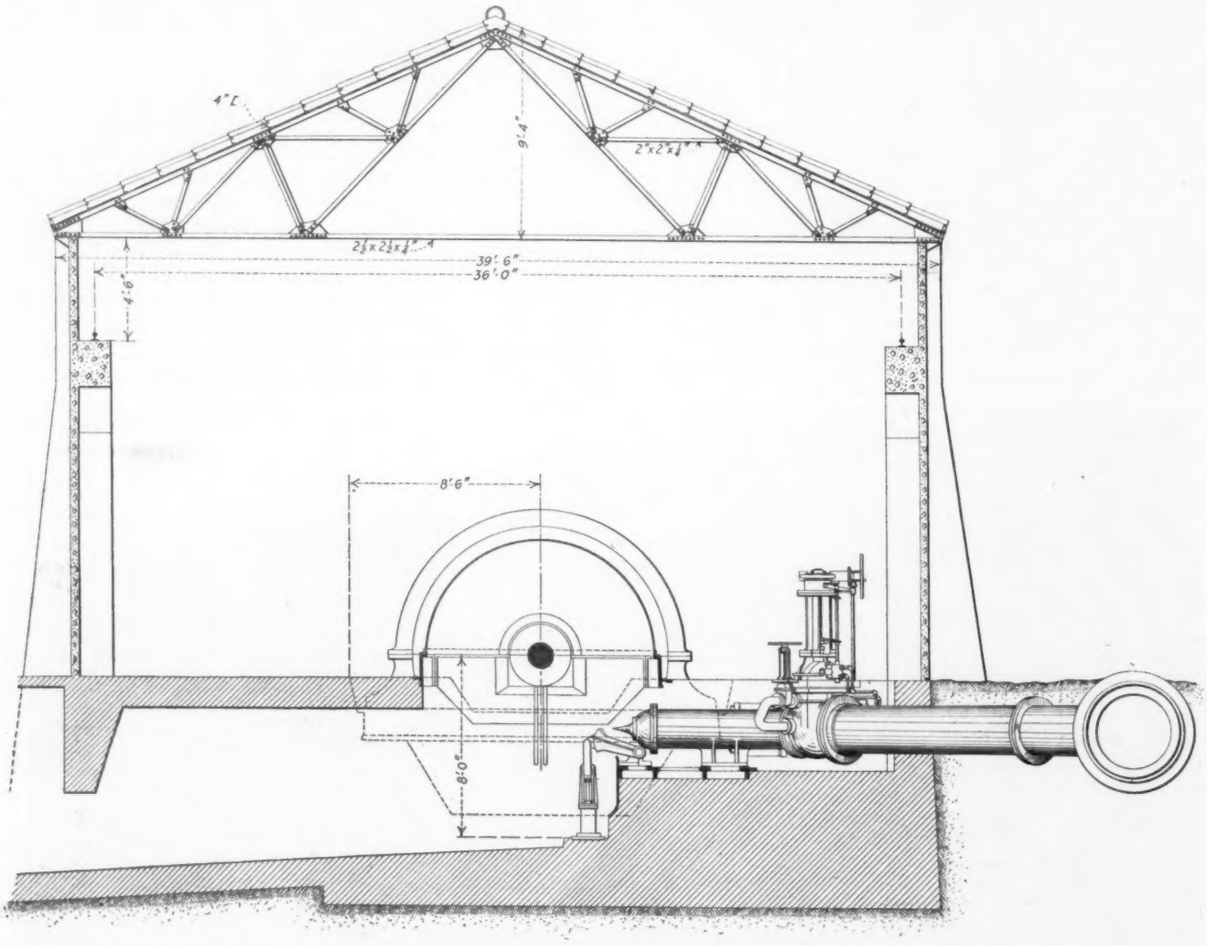


FIG. 24—ELEVATION OF GENERATING STATION NO. 2

Generating Station No. 3

The tailrace water of station No. 2 discharges directly into the intake of station No. 3, with no loss of head except that necessary to carry the water clear of the waterwheels. The intake for station No. 3 is formed by constructing a reinforced-concrete dam across the creek. This intake pond is rather small, owing to the rapid fall of the stream at that point. The dam is 25 ft. high in the middle of the stream and tapers up with the profile to 10 ft. in height. Bedrock could not be had at this point in the stream bed, the whole canyon being a morain wash. A trench was dug across the stream and sunk to a depth of 6 ft. below the stream bed, where a firm formation of clay and gravel was encountered. The curtain-wall trench was sunk to a depth of 2 ft. into this formation, which served as a seal to cut the water off. Fig. 29 shows the general design of the dam. Fig. 27 is a view of the dam during construction and Fig. 28 is the dam completed.

It will be seen that the spillway section is of cyclopean construction, some of the stones in this section being as much as a cubic yard in bulk. The surface of the spillway section was finished to form, with a concrete mixture of one-two-four, and on top of this a finishing surface was troweled on to a thickness of 1½ in., this mixture being one part cement to two parts sharp sand. The 36-in. sluicegates are placed on the upstream face of the dam, each covering a 36-in. round port through

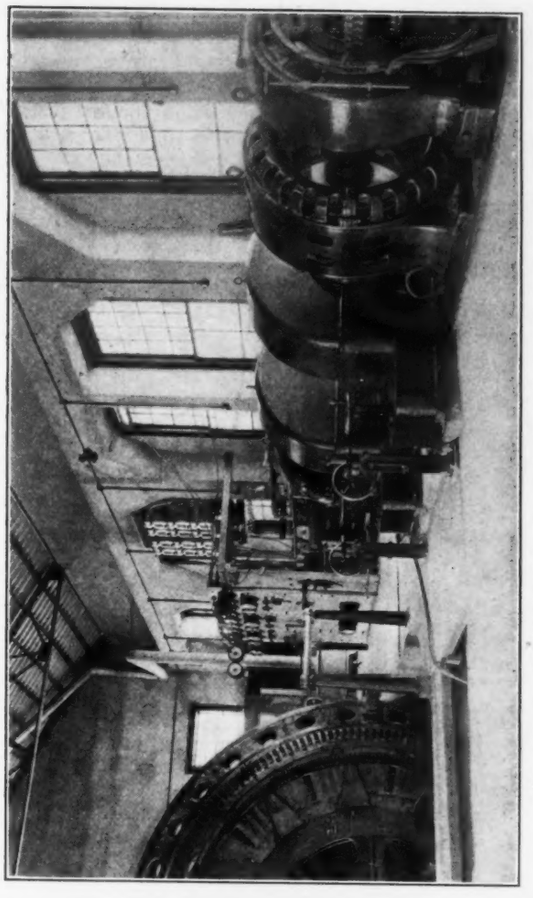


FIG. 26—SWITCHBOARD AND EXCITER UNITS

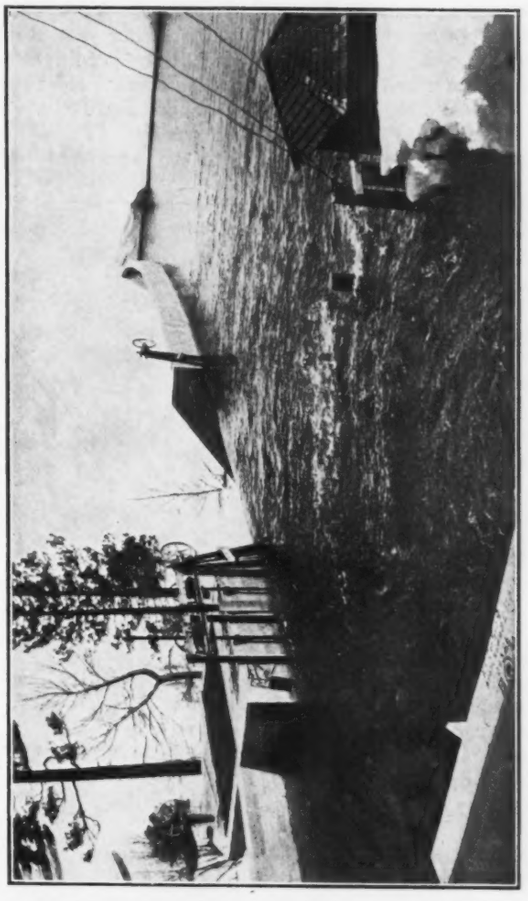


FIG. 28—DAM FOR STATION NO. 3 COMPLETED

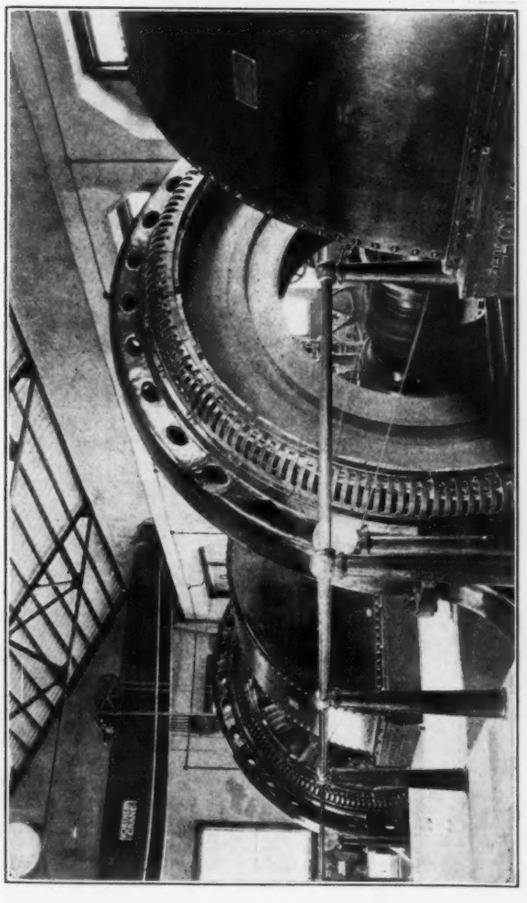


FIG. 25—INTERIOR VIEW OF STATION NO. 2

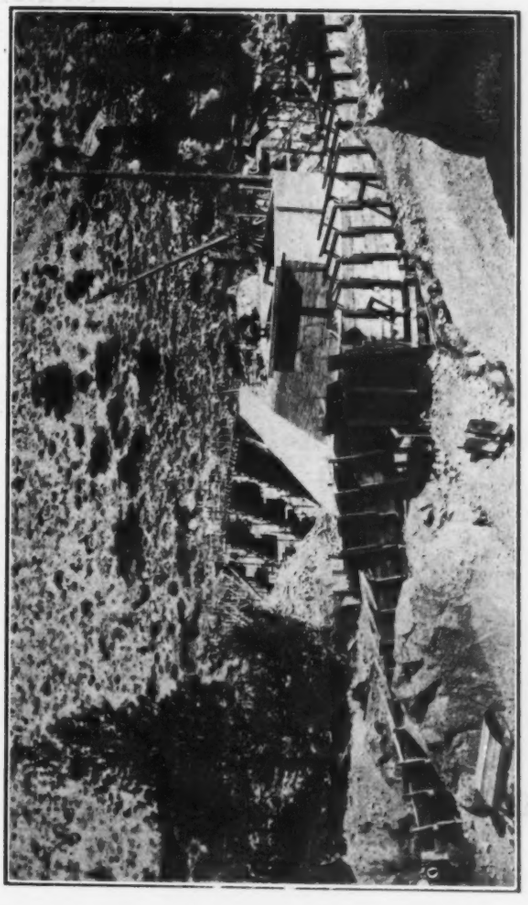


FIG. 27—DAM FOR STATION NO. 3 UNDER CONSTRUCTION

the bottom of the spillway section. These sluice ducts are found to be quite necessary each season, after the high-water period, to clear the pond of the accumulated deposit of sand and gravel. There are some special features in connection with the screen chamber that might be of interest. Fig. 32 shows its design. There are two draw-off pipes, 12-in. in diameter, arranged just back of the screens at the bottom of two separate gravel pits. As the sand and gravel is washed into the chamber, it is caught in these traps and drawn out by opening the gates of the intake chamber. There is an emergency horizontal swing gate provided which automatically closes the opening to the flow pipe. Should a break occur in the wood-stave flow line and cause a sudden rush of water through the pipe, there is an auxiliary gate, 12 in. by 12 in., in the center of the large gate and operated by the same mechanism, that can be used for filling the pipe to equalize the pressure on the large gate so that it can be easily opened. An 18-in. standpipe on the flow line directly below the trap gate admits air to the flow pipe to prevent its collapse when the trap gate closes. The flow line is provided with 8-in. drop air valves every 1000 ft.

The unit costs of this intake dam were as follows:

Taking care of water	$300.00
Placing gates and screens	600.00
	Per Cu. Yd.
Excavating above water line, earth	$0.75
Excavating below water line, earth	1.00
Excavating below water line, loose rock	1.50
Concrete, one-two-four mixture, including reinforcing	16.50
Concrete, one-two-six mixture, including reinforcing	13.50
Spillway, allowing 40 per cent hand-placed rock	12.00
(Company furnished all gates and fittings. Reinforcing steel cost contractors, $90 per ton laid down. Cement cost contractors $6 per barrel, laid down.)	
Rock crushed on ground	$1.00
Sand cost for hauling	1.00

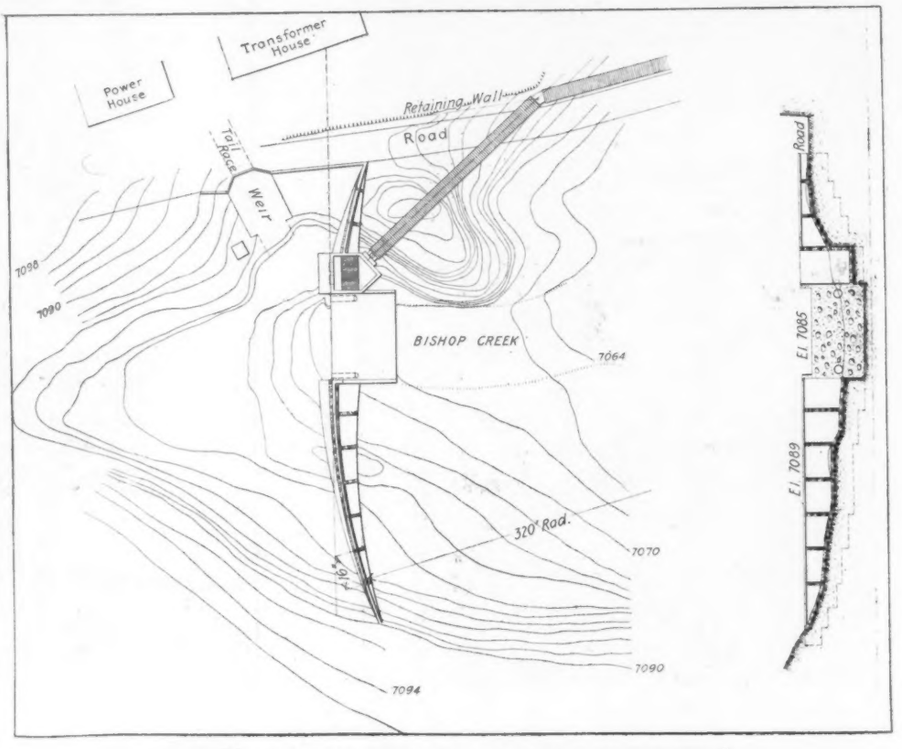


FIG. 29—GENERAL DESIGN OF DAM FOR STATION NO. 3

Flow Line

The flow line is composed of redwood staves, made from 2½-in. by 6-in. stock, 60-in. inside diameter. There are thirty-seven staves to the circle, and ⅝-in. steel bands are used with two shoes to the circle. The spacing varies from 10-in. to 3½-in. centers. The bands are figured with a factor of safety of four, using the ultimate strength of the steel as 56,000 lb. per square inch. Steel dowels ⅛ in. by 1½ in. in size are used to join the ends of staves. The pipe is 13,029 ft. in length and is laid on a uniform grade of 4 ft. per 1000 ft. At a point 1200 ft. from the lower end there is a steel standpipe 54 in. in diameter and 136 ft. in length, laid in a trench on the hillside. Its upper end reaches over a divide and discharges the water down a hill away from the pipe line. At the junction of the wood-pipe and steel pressure line there is another steel vertical standpipe 54 in. in diameter and 80 ft. high. These standpipes are used for relief ports and act as surge tanks in supplying water to the station instantly for sudden fluctuations of load.

The flow line is laid on a morain-wash hillside, upon a bench excavated out to a width of 9 ft. Fig. 30 is a view of the pipe near the upper standpipe. After the leaks were all taken up the pipe was covered with earth to a depth of 9 in. Rock walls were used to retain the dirt on the lower side of the pipe. This pipe cost,

FIG. 30—REDWOOD PIPE LINE

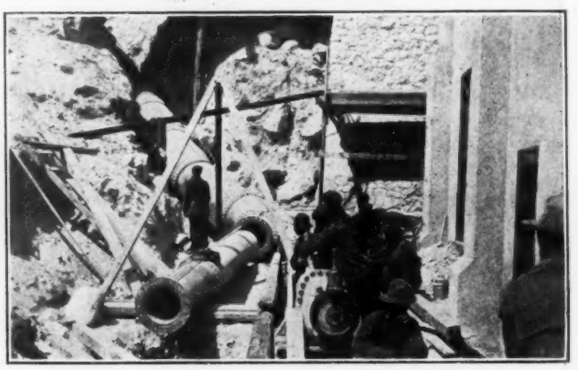


FIG. 31—LOWER END OF PRESSURE PIPE

complete, $9 per lineal foot. There are a number of steel angle pieces in this line, used where the radii of the curves were too short to permit the pipe to make the bend.

Pressure Line

The steel pressure line joins the flow line at the lower standpipe and connects directly with a 54-in. cast-iron gate valve with bypass. The line is 4360 ft. in length, with diameters varying from 54 in. at the upper end to 48 in. at the lower end. The plates vary from 3/16 in to ¾ in. Fig. 31 is a view of the lower end taken during the construction period.

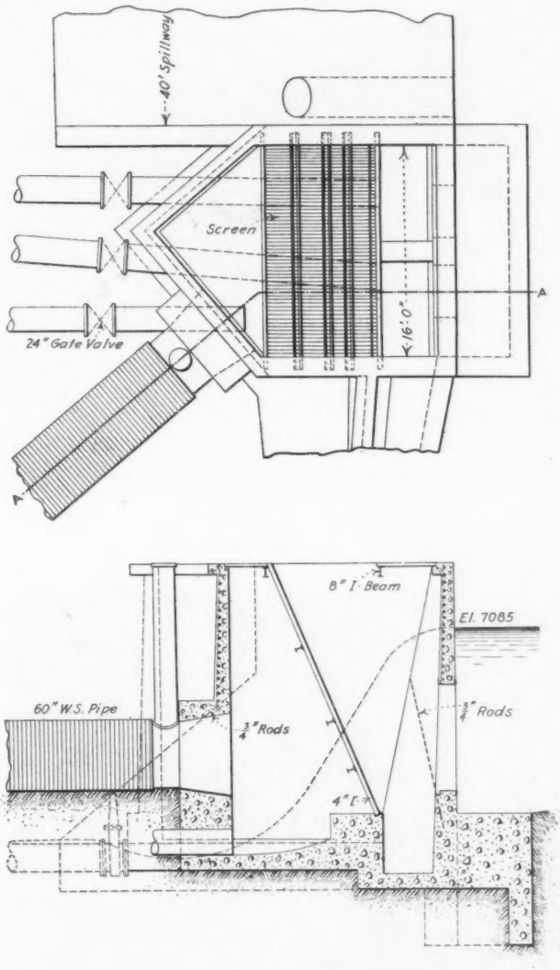


FIG. 32—DESIGN OF SCREEN CHAMBER

At the power house the pressure line terminates in a reducing manifold, this manifold being turned 53 deg. away from the general line of the pressure pipe. There are three 24-in. branches taken off, by means of cast-steel saddles riveted to the plates of the manifold, these saddles being lined up with gates and waterwheel nozzles before being riveted to the manifold, thus insuring a perfect fit. It has been found that this method of taking off branches is much more satisfactory and safe than using cast-steel Y branches. An 18-in. branch is taken off at the pipe angle and leads off in line with the pressure pipe, to which is connected an Allis-Chalmers relief valve, adjusted to blow off at 10 per cent overpressure and relieve the pipe from undue pressure stress. This relief valve is very sensitive and automatically takes care of any abnormal pressure rise. The pipe line is securely held in place by means of eight heavy concrete piers placed at advantageous points.

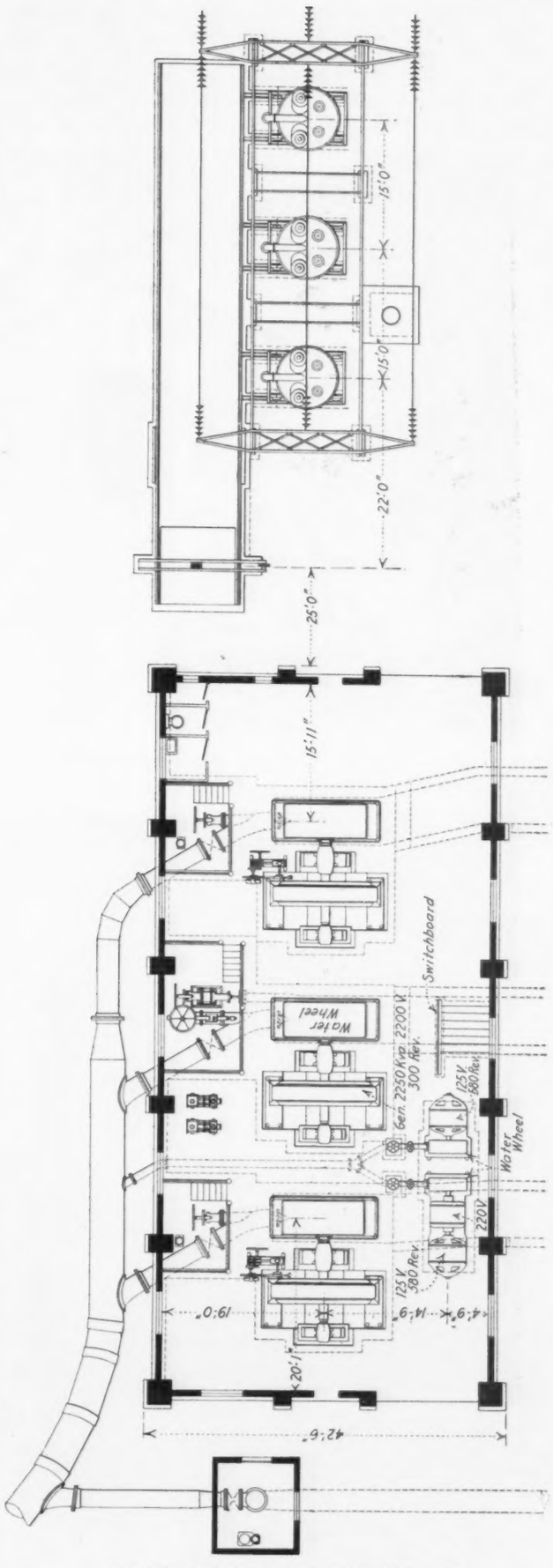


FIG. 33—PLAN VIEW OF STATION NO. 3

The pipe was painted with two coats of metal paint, both inside and out, one coat before leaving the shops and the second coat after being riveted together in the trench. The pipe was finally completely covered with earth to a depth of 1 ft., thus protecting it from the sun's rays and preventing excessive expansion and contraction when the pipe is emptied for any purpose. The variation of temperature in the water is not sufficient to cause trouble, and there are no expansion joints in any of the pipe lines.

FIG. 34—EXTERIOR VIEW OF STATION NO. 3

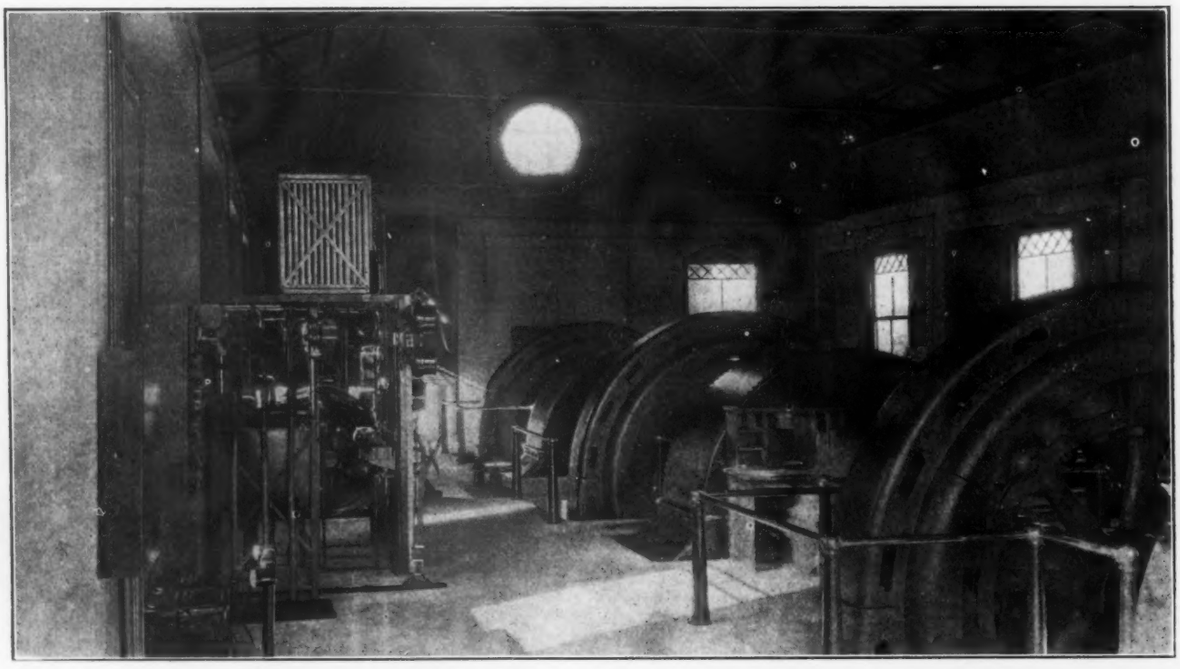


FIG. 35—INTERIOR VIEW OF STATION NO. 3

The Station

It will be noted that the station is situated to one side of the pressure pipe, this being done partly on account of ground conditions with reference to the creek, and also to protect the power house from damage, should the pressure line develop a serious leak, by allowing the flow of water to pass into the creek. Fig. 33 shows the plan of the building, Fig. 34 its exterior, and Fig. 35 a general view of the plant. There are three separate tailraces leading from the building to the water level in the intake reservoir of station No. 4, one tailrace for each generating unit in the plant, thus permitting access to any one unit while the remaining two are in operation.

There are three 2250-kw Crocker-Wheeler generating units in this plant, wound for 2200 volts, three-phase,

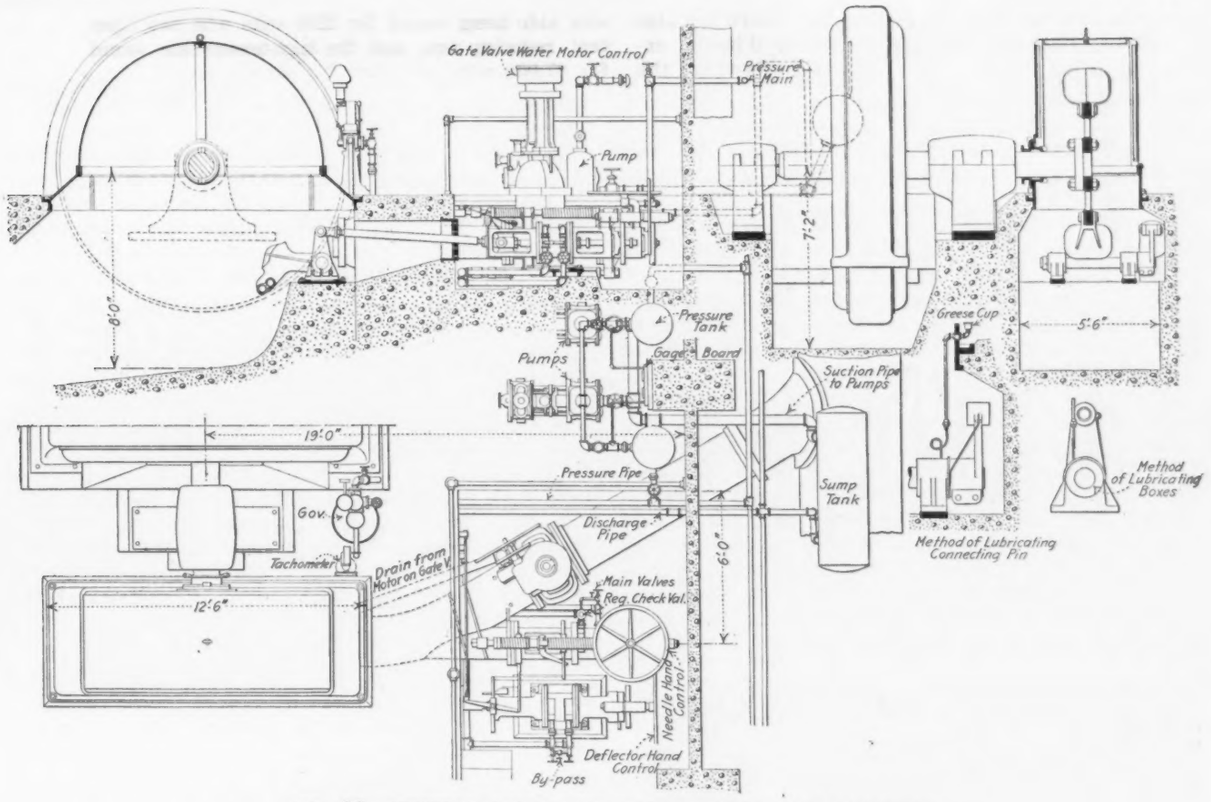


FIG. 36—GENERAL DESIGN OF WATERWHEELS AND GOVERNOR

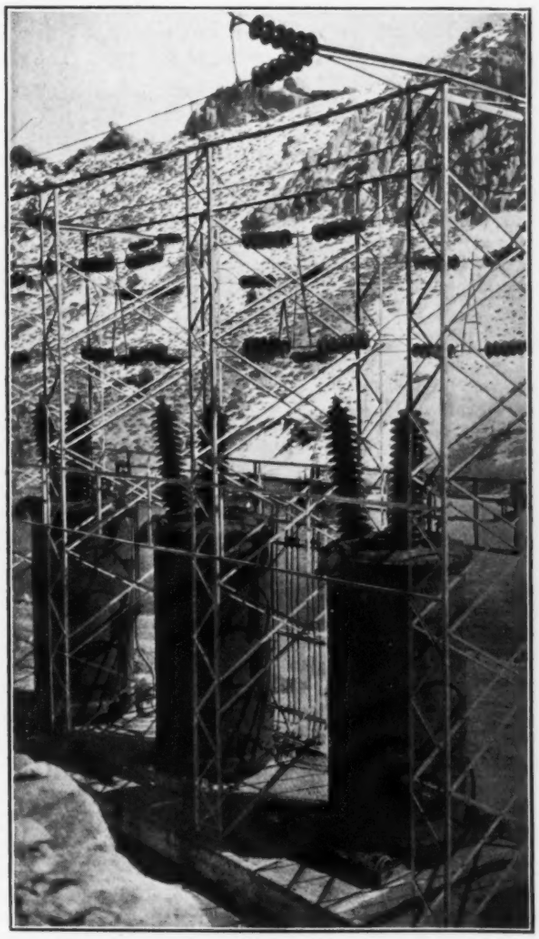


FIG. 37—OUTDOOR BUS STRUCTURE

FIG. 38—TIE LINE FROM STATIONS TO TOWER LINE

sixty-cycle, and operating at 300 r.p.m. There are also two 100-kw, 120-volt, 600-r.p.m., Crocker-Wheeler exciters, one being driven by an impulse waterwheel, the other driven by a waterwheel and by a 150-hp, 2200-volt, three-phase Crocker-Wheeler induction motor, either unit being ample to supply the excitation for the three generators. The exciters are controlled by a Tirrill regulator.

The switchboard consists of three generator panels and two exciter panels, the generator panels being connected with a common bus through non-automatic oil switches. The 2200-volt leads to the transformers tap on the end of the 2200-volt bus and drop down through an oil switch, by means of which the plant can be quickly disconnected from the system.

The hydraulic equipment consists of three impulse wheels mounted on the overhung shaft of each generator. The pitch diameter of the waterwheel buckets is 73 in. There are fifteen buckets per wheel, each bucket being secured to the cast-steel runner by means of two 2¾-in. steel bolts. The buckets are also of cast steel. The wheel runners are fastened to the shaft by bolting to a 24-in. diameter flange forged upon the generator shaft. A boss projects through the wheel runner, centering it. Water is supplied to the wheel through an 8-in. orifice stationary nozzle. Two of the

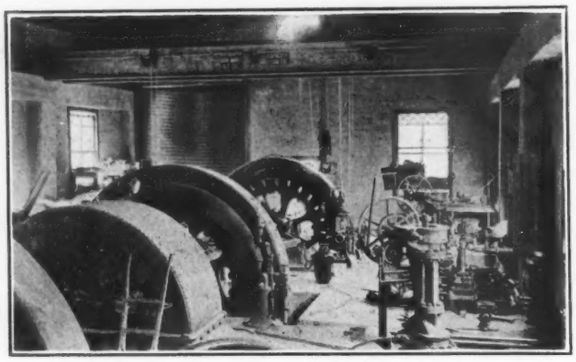


FIG. 39—INTERIOR OF STATION NO. 3

units are provided with hand-regulated needles and governor-operated balanced stream deflectors. The third unit consists of an automatic governor-actuated needle and stream deflector. The relation between the needle and stream deflector is such that water is quickly applied to the wheel by opening the needle and drawing the deflector out of the stream. When less water is required the governor causes a quick movement of the deflector into the stream, the needle slowly closes, and the deflector recedes from the stream proportionally to the closing movement of the needle, thus effecting regulation without serious variation in the water pressure. The effective head in this plant is 780 ft. The last described unit is controlled by a Woodward governor, and the other two units are supplied with Lombard governors. Any of the units can be controlled by hand, independent of the governors, and the deflectors can be locked in any position.

The hydraulic equipment, except the pressure-pipe relief valve, was furnished by George J. Henry, Jr., of San Francisco. Fig. 36 shows the general design of the waterwheels and governor. Fig. 39 is another interior view of the station, which is provided with a 20-ton traveling crane, made by the Cyclops Iron Works, of San Francisco.

The transformers at this plant are of the outdoor type, and are installed 80 ft. away from the power-house building. The bank consists of three 2000-kva water-cooled Westinghouse transformers, the low-tension side being wound for 2200 volts, with two 5 per cent reducing taps, and the high-tension side wound for 87,000 volts, with four 2½ per cent reducing taps and an extra tap for 55,000 volts. The transformers are all insulated and designed for star connection to 150,000 volts, which will be the voltage ultimately used. At the present time the 55,000-volt taps are being used, as that is the voltage of the transmission system at present. The transformers are mounted on trucks and so arranged that they can be rolled out upon a transfer truck, taken under a hoisting frame and lowered into a pit, where the cores can be taken out of the cases for inspection and repairs. Fig. 37 is a general view of the transformers, switch frame and bus structures. The 2200-volt buses are made up of 1-in. copper pipe, supported on special porcelain insulators, each transformer being connected to the bus by means of outdoor-type disconnecting switches. The high-tension bus extends across the top of the transformers and is connected to them through disconnecting switches. The line connects to the bus through an outdoor double-break horn-type Bowie switch on the end of the steel structure. Only one break of the switch is installed at the present time; the other part will be put in when the voltage is raised.

Plant No. 3 Tie Line

The tie line from this plant leads directly to the control station, a distance of 4 miles down the creek. This line consists of No. 0 stranded copper supported on steel lattice poles by six 10-in. disk suspension-type insulators. A wishbone type of cross-arm is used which gives a separation of 10 ft. between wires. Fig. 38 is a view of this line. The weight of the pole is 1700 lb., and it is 58 ft. in length. The pole is set 8 ft. in the ground, and embedded in concrete. It will withstand a stress of 6000 lb. applied at the top. The poles are spaced twelve to the mile.

Hints on Avoidance of Accidents

The Utilities Mutual Insurance Company, formed by gas and electric companies of New York State to meet their requirements under the workmen's compensation law, will issue a monthly bulletin to give members information in regard to accidents that have happened and suggestions for means by which similar accidents could be prevented in the future. Among the accidents and suggestions mentioned in the first bulletin are the following:

"A number of minor accidents have occurred by men having their feet injured by nails in box covers. The importance of removing excelsior from packing boxes is important from an accident-prevention viewpoint, as well as from that of fire prevention.

"A great many minor accidents have been reported caused by material or tools dropping from overhead lines. A careful inspection should be made of the linemen's tools. In many cases the clamps are worn and loose and when pliers or wrenches are carried in belt they are easily dislodged and serious accidents have occurred.

"A number of accidents have been reported where blood poisoning has followed scratches received in handling material; the first-aid outfit will prevent this result.

"A flywheel on a belted engine burst; power house, generating apparatus and other apparatus was damaged, although fortunately no one was seriously injured. Your special attention is called to the importance of frequent examination of flywheels, also the governing apparatus on engine. Flywheels are subjected to severe strains due to short-circuiting or racing."

Parallel Operation of Subway Transformers

Difficulties experienced in congested business districts from the inadequacy of equipment that one manhole can contain, and how they may be overcome. By Richard C. Powell

IN very congested business districts where the lighting load is carried exclusively by an alternating-current system it may happen that the load to be taken from a single manhole requires considerably more transformer equipment than the manhole is capable of containing on account of its failure to dissipate the heat arising from the losses.

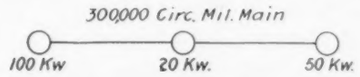


FIG. 1—THREE TRANSFORMERS IN PARALLEL AND ONE CARRYING PRACTICALLY NO LOAD

It may become necessary to supply the excess energy from an adjacent manhole, usually from 50 ft. to 150 ft. distant. Unless the transformers have the proper characteristics, there is grave and almost certain danger of overheating. Sometimes a transformer "banked" with others will refuse to carry even a small portion of the load supplied from its own manhole, but will throw most of it to other transformers situated perhaps several hundred feet distant.

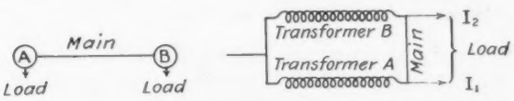
In a case which came to the writer's notice a 20-kw unit was banked with a 50-kw and a 100-kw unit, as shown in Fig. 1.

With 20-kw load supplied from the center manhole less than 3 kva passed through the 20-kw transformer, the 100-kw and the 50-kw units taking practically the entire load. The 20-kw unit was, therefore, almost entirely excess equipment, and hence was removed to a location better suited to its characteristics.

Considerable variation exists in the impedance volts, and in the ratio of resistance to reactance in subway transformers. This fact and the difficulties mentioned above make it highly desirable to predetermine the operation of subway transformers.

In what follows the numerical values for resistance and reactance stated are based on measurements made on individual transformers, and not on fictitious or average values. The loads are considered to be noninductive and the voltage drop in the mains so small that the load currents may be considered as in time-phase with the voltage. The mains are assumed to have no reactance.

By neglecting the exciting currents and reducing all secondary resistances and currents to the equivalent



FIGS. 2 AND 3—INTERCONNECTION OF TWO TRANSFORMERS

primary values* each transformer may be replaced by an impedance coil.

The simplest case is that of two transformers interconnected by a main and supplying load from each manhole, as in Fig. 2. The equivalent network is shown by Fig. 3.

Let i_1, r_1, x_1 and z_1 and i_2, r_2, x_2 and z_2 be the equivalent currents, resistances, reactances and impedances for transformers A and B respectively. The equivalent resistance of the main r_3 is the resistance of the double

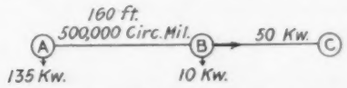


FIG. 4—TWO TRANSFORMERS OPERATED IN PARALLEL TO SHARE LOADS EQUALLY

distance multiplied by the square of the ratio of transformation. The load currents are I_1 and I_2 as shown in the figure, and the current in the main is i_3.

From Kirchhoff's law are obtained the vector equations:

$$i_1 + i_2 = I_1$$
$$i_2 - i_3 = I_2$$
$$i_1 z_1 - i_2 z_2 - i_3 r_3 = 0,$$

from which is readily obtained the vector equation

$$i_1 = \frac{(I_1 + I_2)\, z_2 + I_1 r_3}{z_1 + z_2 + r_3}, \qquad (1)$$

with similar equations for i_2 and i_3.

Since I_1 and I_2 have been assumed to be in time-phase with each other, the algebraic equations are easily written. They are

$$i_1 = \frac{1}{z}\sqrt{(Ir_2 + I_1 r_3)^2 + (Ix_2)^2} \qquad (2)$$

$$i_2 = \frac{1}{z}\sqrt{(Ir_1 + I_2 r_3)^2 + (Ix_1)^2} \qquad (3)$$

$$i_3 = \frac{1}{z}\sqrt{(I_1 r_1 - I_2 r_2)^2 + (I_1 x_1 - I_2 x_2)^2} \qquad (4)$$

where

$$I = I_1 + I_2 \text{ and } z = \sqrt{(r_1 + r_2 + r_3)^2 + (x_1 + x_2)^2} \qquad (5)$$

As an example assume that the loads are 50 kw and 75 kw from manholes A and B respectively—that is, 21 amp and 31.5 amp primary (240-volt secondary and 10:1 ratio)—and that neither manhole is of sufficient size to contain a 125-kw transformer without overheating. The problem is to determine how a 50-kw transformer in manhole A and a 75-kw transformer in manhole B connected by 125 ft. of 300,000-circ. mil cable will share the load.

FIGS. 5 AND 6—TWO TRANSFORMERS WITH LOAD BETWEEN

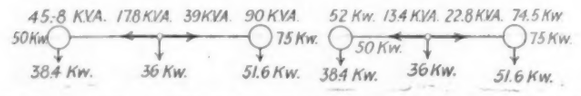
By substituting in the equations above

$r_1 = 1.50$ ohms,
$x_1 = 3.39$ ohms,
$I_1 = 21$ amp,
$r_2 = 0.96$ ohm,
$x_2 = 0.52$ ohm,

*Secondary resistances are multiplied by the square of the ratio of transformation, and secondary currents are divided by this ratio.

$I_s = 31.5$ amp,
$r_s = 0.90$ ohm,
it is found that the 50-kw transformer will carry 34.6 kva (14.4 amp), the 75-kw transformer 97 kva (40.3 amp), and the main 25.4 kva (106 amp secondary current).

In actual practice it is generally assumed that transformers divide the load according to their ratings. Hence the installation would, in general, be made as sup-



FIGS. 7 AND 8—DIVISION OF LOAD BETWEEN TWO TRANSFORMERS

posed in the example, and the 75-kw unit would later be exchanged for a 100-kw unit under the belief that the load from manhole *B* had been underestimated.

It is easily shown that the currents in an alternating-current network will divide according to the resistances—that is, the same as for direct current—if the ratio of resistance to reactance is the same for all branches. Hence if 1.65 ohms reactance be added to the 75-kw transformer, each transformer will carry its rated share of the load and there will be practically no interconnecting current in the lead, since the resistances and reactances of the two transformers are inversely proportional to their ratings.

In certain cases dissimilarity in characteristics may be an advantage. In one case 50 kw was being supplied from manhole *C* (Fig. 4) with little or no loads from manholes *A* and *B*, when, owing to the erection of large buildings, it became necessary to supply 135 kw from *A* and 10 kw from *B*. The *A* manhole was small and 100 kw in transformer rating was its limit. By installing a 100-kw transformer in each of the manholes *A* and *B* the transformer in *C* could be removed. It is evident that in this event the transformer in *B* must have the lower impedance, and the two must be connected by cable of sufficiently low resistance.

From the 100-kw transformers available, selection was made of two having the following measurements: For manhole *A*, resistance, 0.643 ohm; reactance, 0.895 ohm. For manhole *B*, resistance, 0.52 ohm; reactance, 0.68 ohm.

By substituting these values in the equations above and assuming 500,000-circ. mil for the interconnecting main, the reader may readily verify the result that the out-of-phase currents will be negligible and each transformer will carry approximately its rated share of the load.

An arrangement leading to somewhat more complicated equations is that of two transformers separated by a greater distance than in the preceding examples, where load is supplied not only from the two transformer manholes but also from a service hole between.

FIG. 9—DIVISION OF LOAD BETWEEN TWO TRANSFORMERS

This is shown in Fig. 5, with the equivalent network shown in Fig. 6.

By writing down Kirchhoff's equations (vector) and solving, as shown in the preceding case, the reader will have no difficulty in verifying the following results:

Assume the 50-kw and the 75-kw transformers in the first example installed in manholes *A* and *B* respectively. Let them be connected by 300 ft. of 250,000-circ. mil cable with 160 amp taken from *A*, 215 amp from *B*, and 150 amp from the service manhole half way between.

The numerical results are shown in Fig. 7, in which the loads are shown in kw and kva. By adding 1.65 ohms reactance to the 75-kw transformer the loads will divide as in Fig. 8.

Assume as in the first example that the overloaded 75-kw transformer is exchanged for a 100-kw unit. This later would probably have 0.63 ohm resistance and 0.87 ohm reactance. After this change the results would be as shown in Fig. 9.

This would be satisfactory in so far as overload on the transformers is concerned. But to supply 126-kw load 150 kw in transformer equipment is required, and to supply 36 kw from the service manhole requires 55 kva in the mains.

The above shows that an alternating-current network is liable to produce excessive losses by reason of out-of-phase currents. If the losses for the cases shown in Figs. 8 and 9 are compared, it will be found that the arrangement of Fig. 9 produces 11 per cent more copper losses than that of Fig. 8. The case shown in Fig. 7 produces 27 per cent more copper losses than that of Fig. 8. By the mere addition of a reactor to the 75 kw transformer, the cost of which is very small, 25 kw in transformer equipment and 11 per cent in copper losses can be saved, as can also the difference in core loss of a 75-kw over a 100-kw transformer. The voltage regulation will also be somewhat improved.

Status of Rural Electric-Service Customers in Iudiana

In preparing a paper for the recent convention of the Indiana Electric Light Association, Mr. A. R. Holliday, of Indianapolis, addressed circular letters to utilities in the State inquiring whether or not they had demands for electric service from rural inhabitants. The majority of the companies answered in the affirmative, and the accompanying table was made to show the present status of rural service in the State.

DATA ON RURAL CUSTOMERS IN INDIANA

Company	Number of Customers	Number of Motors	Monthly Minimum	Maximum Rate per Kw-hr.
Citizens' Heat, Light & Power Company, Winchester	10	2	$1.50	$0.10
Fort Wayne & Northern Indiana Traction Company	82	15	0.50	0.08
Huntington Light & Fuel Company	12	..	1.00	0.10
Indiana General Service Company, Elwood	20	4	1.00	0.10
Indiana Railway & Light Company, Kokomo	106	7	1.00	0.12
Indianapolis Light & Heat Company	*761	132	1.00	0.10
Laporte Gas & Electric Company	12	1	2.00	0.12½
Liberty Light & Power Company	12	None	1.50	0.13
Muncie Electric Light Company	25	18	1.00	0.10
Noblesville Heat, Light & Power Company	214	34	.50	0.10
Putnam Electric Company	60	None	1.00	0.12½
Terre Haute, Indianapolis & Eastern Traction Company	32	..	2.00	0.10
Union Traction Company	10	4	1.00	0.10

*Includes Indianapolis suburbs and small towns.

Among the companies listed different practices obtain in regard to the matter of whether the customer shall pay for lines and transformers. In a few cases the customer is treated on the same basis as the city customer, the company assuming all expense, including service connection. In other cases the customer pays all line and transformer expense and gives the company the option of buying back the line.

Central Station Management

Devoted to Discussion of Administrative Policies, Commercial Methods and Current Practice Among Successful Utilities

Centralizing Energy Production at Louisville, Ky.

Ever since the electric-service companies in Louisville, Ky., were consolidated into the Louisville Gas & Electric Company there has been a tendency to transfer the generation of energy from the old stations to the new Waterside station, which was described in the *Electrical World* for Oct. 25 and Nov. 1, 1913. This plant and the old Fourteenth Street plant have been connected by a tie-line which permits of distributing the energy generated in either station over the feeders radiating from the other. During the past twelve months the Waterside station has generated about half of the energy supplied by this company, while the remainder was developed at the Fourteenth Street plant. An extension to the Waterside station has been very nearly completed to accommodate generating equipment to carry the entire load of the system. Centralization of energy production at this plant has been considered preferable as condensing and boiler-feed water is obtained through tunnels extending into the Ohio River, while water for similar purposes at the Fourteenth Street station has to be pumped from deep wells. Other advantages of the plant on the Ohio River are that it is conveniently located for the reception of coal by rail or water, that it has facilities for handling cheap grades of coal, and that its equipment is of the most modern and efficient type.

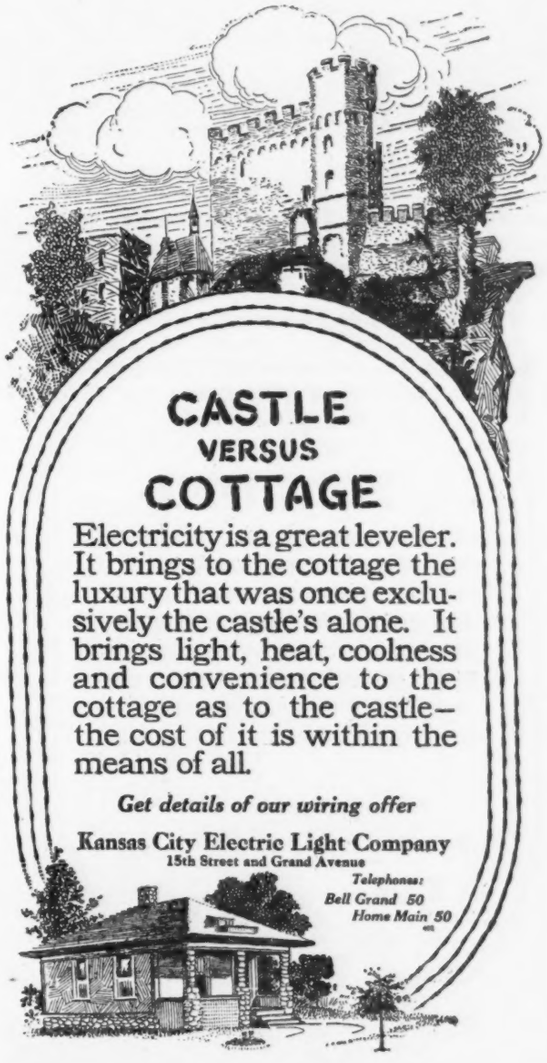
Overhead Charges in Nashua, N. H.

Testimony on overhead charges and other factors which have a bearing on the value of the property are mentioned in the decision of the Public Service Commission of New Hampshire authorizing the Manchester Traction, Light & Power Company to purchase stock of the Nashua, Light, Heat & Power Company.

The property of the Nashua company, exclusive of land, was valued on the basis of cost of reproduction new and less depreciation, by Messrs. Sloan, Huddle, Feustel & Freeman, of Madison, Wis., on behalf of the commission, and by Mr. Hollis French, of Boston, on behalf of the petitioner. Mr. Feustel, of the firm which made the valuation for the commission, allowed 15 per cent for overhead charges, while Mr. French testified that, in his opinion, 21 per cent was a reasonable allowance. Mr. Feustel also depreciated his overhead charges, while Mr. French did not. The conclusion of the commission was that the allowance made by Mr. Feustel was ample and that overhead charges should be depreciated. As the plant, according to the commission, has always paid a fair return and has also earned enough to enable its owners to put back into the property a sum in excess of the total depreciation, no allowance was made for going-concern value considered as an item to be appraised separately. The commission adds in its decision: "Of course, what is being valued is a plant with business attached in full and profitable operation, and our valuation is made with that fact clearly in mind." Although the stock of the petitioning company was selling at 140, the commission had no hesitation in authorizing the new issue at par.

Effective Advertising Campaign in Kansas City

The Kansas City (Mo.) Electric Light Company, which recently gave a very successful "fall festival electric," has made a great success in selling all sorts of appliances and devices in its Electric Shop and also in its campaign for wiring houses. The efforts of the company in the "festival electric" were confined to the display of household equipment, including everything from the parlor through the dining-room, sewing-room, kitchen and the basement laundry, and this centering of effect brought definite results. The accompanying illustration shows a rather striking advertisement which appeared in the Kansas City papers recently stating tersely the universal advantages of electricity.


CASTLE
VERSUS
COTTAGE
Electricity is a great leveler. It brings to the cottage the luxury that was once exclusively the castle's alone. It brings light, heat, coolness and convenience to the cottage as to the castle—the cost of it is within the means of all.
Get details of our wiring offer
Kansas City Electric Light Company
15th Street and Grand Avenue
Telephones:
Bell Grand 50
Home Main 50

REPRODUCTION OF A PICTURESQUE ADVERTISEMENT OF KANSAS CITY COMPANY

Steam-Power Versus Electricity for Filling Silos

Customers on the rural lines of the Noblesville (Ind.) Heat, Light & Power Company have been trying both steam and electric drive for filling silos and have found the latter method the less expensive. Individual

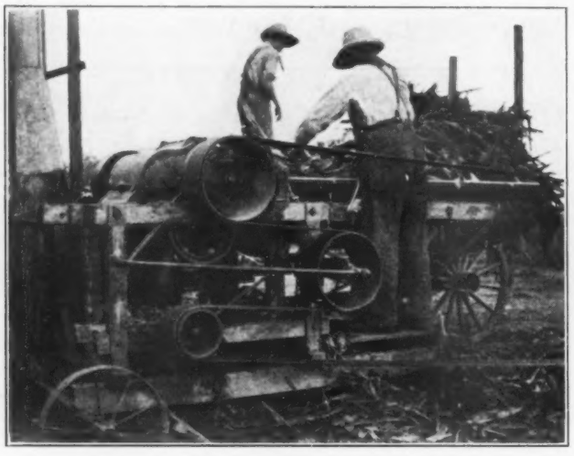


FIG. 1—FEEDING ENSILAGE TO THE CUTTER

farmers or groups of farmers have bought the shredders and blowers used for cutting and elevating ensilage, so that in considering the comparative costs this piece of machinery need not enter. For the use of a steam traction engine, though, the daily charge is $5—not including the engineer's wage of $3, the cost of coal at about $3, or the water hauling at about $1.50. Hence the actual total cost of steam-engine drive is about

ENERGY REQUIRED FOR FILLING SILOS

Test Number	Tonnage of Silo	Energy in Kw-hr.
1	50	52
2	75	60
3	125 (two silos)	152
4	50	88

$12.50 a day, and it is found that time is generally lost in the morning in firing up the engine.

For the farmers who wish to use electricity, however,

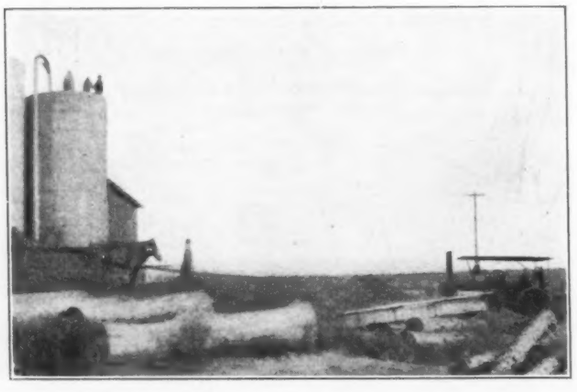


FIG. 2—THE OLD WAY—STEAM-ENGINE DRIVE

the Noblesville company has bought and maintains a 15-hp motor and a bank of transformers mounted on a wagon truck. This outfit complete with starting equipment and wiring is rented to those who wish to use it for $5 a day, the rental charge covering also the energy consumption. In addition to filling silos this portable power plant has been used for hulling peas and shredding fodder, and it is expected that "farmers' rings" in different communities will purchase this outfit and other similar equipments for their own use in the future.

Records have been kept of the energy consumption

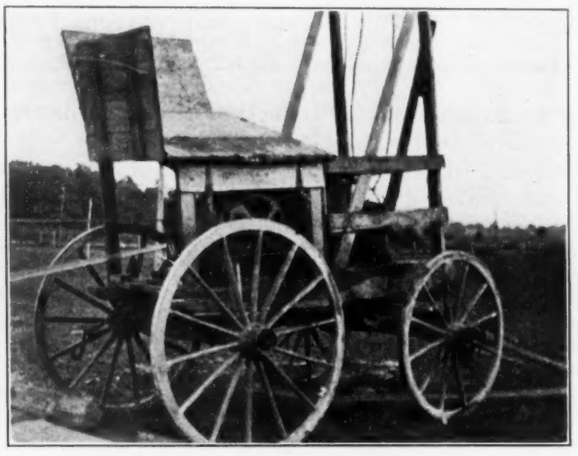


FIG. 3—MOTOR AND TRANSFORMERS ON TRUCK

for several of the silos filled, and some of the representative data are given in the table herewith. The average energy required per ton is 1.17 kw-hr.

Cost of Operating Electrical Dairy

Among the 150 farm-owners in southwestern Ontario receiving electric service from the Hydro-Electric Power Commission are several dairymen. The accom-

UNIT COST DATA FOR DAIRY FARM

Operation	Detail	Percentage of Total Kw-hrs.	Cost	Unit Cost
Pumping water..	Four hours a day	28.3	$17.75	$0.0011 per barrel
Milking.....	421 times—30 cows	23.7	14.98	0.0012 per cow per milking
Separating cream	316 times	8.2	5.20	0.011 per hour
Heating water...	2,420 gal.	29.0	18.35	0.007 per gallon
Lighting.....	.....	10.8	6.74	
Total.....	.....	100.0	$63.02	

panying data were collected from the records of one of these dairy customers for the period from March 16 to Oct. 18, 1913.

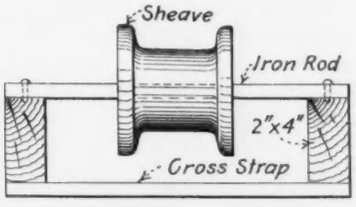
Putting Personality in Advertisements

The Rockford Electric Company, Rockford, Ill., has been running a successful series of house-wiring advertisements a departure in which has been the use of halftone portraits of its salesmen. The text of the advertisements usually relates specifically to work done by the particular salesman, including an introduction to new customers, a letter from a pleased customer or some other matter calculated to arouse the personal interest of the reader in the solicitor's personality—a psychological device that has long been taken advantage of by advertisers in other fields desiring a direct approach to the individual reader. An earlier advertisement includes pictures of a group of sales representatives. The company's indorsement declares that they "know the house-wiring business from A to Z."

Illumination and Wiring

Roller Guides to Facilitate Installing Armored Cable

If long runs of heavy armored cable are to be installed in an earth trench, the friction load of pulling the cable into place may be considerably reduced by supporting it on roller guides placed several feet apart. A



ROLLER GUIDE FOR CABLES

guide which is simple to construct may be made of a sheave supported on an iron rod resting on two short pieces of two-by-four timber held together by cross straps. The sheave should be given considerable endplay to allow for irregularities in the cable. The guides should be placed close enough together to prevent the sags in the cable dragging on the ground. In the accompanying drawing a guide suitable for this purpose is shown.

Pulling Underground Cable

If the lead sheathing on a cable is gouged during installation, moisture may seep in and ultimately cause trouble locally and possibly for a distance on each side of the damaged spot. Should the cable be subjected to excessive bending, the paper insulation may be cracked, thereby lowering the dielectric strength and affording a path for a subsequent breakdown when the conductors are energized. Special care was taken to prevent these effects by the method of cable pulling employed at the Crucible Steel Company's plant at Midland, Pa., where the entire distribution system is underground.

The ducts were first "rodded" to remove obstructions and to thread the pull-in wires through the conduits. The rods were about 4 ft. long and were fastened together by cast-iron male and female hook joints. As the rods were pulled through one duct followed by an iron wire they were pushed into another duct line without unhooking. Hemp line was attached to the wire and pulled into the duct, leaving the rope for the final pulling of the cables. The men rodding the ducts were sent ahead of the cable-distributing gang, which consisted of six men who delivered the cable on trucks capable of carrying two reels. The reels were marked, showing the size of the cable, the number of the run, the terminal manholes and the amount of clearance to be left at each manhole.

For attaching the cable to the pull-in line a woven-wire grip was employed. This was slipped over the end of the cable and fastened to the hemp rope by a pair of "sister hooks." Before this was done, however, a brass casting shaped like the bell of a horn was inserted in the entrance to the conduit to prevent the lead sheath being damaged during pulling. To lead the line out of the duct a frame supporting sheaves was placed in the next manhole. This frame was made of two 15-ft. channels fastened back to back about 5 in. apart. At each end of the structure a set of eight 1-in. holes was drilled to receive spindles on which the sheaves turned. One sheave was placed opposite the outlet to the duct that was being threaded, and another was placed 4 ft. above the ground, leading the rope to the pulling winch. The winch, which was operated by a 2.5-hp motor, was found amply strong to pull the longest cable installed, which was about 330 ft.

During the actual pulling men were stationed as follows: One in the manhole into which the cable was being drawn, another where the line emerged, a third at the cable reel to operate a brake in case the cable fed faster than it was being pulled, and a fourth at the pulling winch. As the cable was being fed into the duct it was liberally smeared with cup grease to reduce friction. At no time was the reel allowed to revolve fast enough to let the cable drag on the ground and become bruised. As the cable emerged from the duct the man at the winch was signaled to "ease off" the winch, allowing the cable to be pulled slowly. Rule in hand, the attendant in the manhole watched the emerging cable until the desired amount had appeared, when he ordered a full stop. With alert men it was possible to pull cable within 1 in. of the desired clearance.

Lighting Equipment of U. S. Dredge "Buras"

In the accompanying illustration is shown a night view of the United States dredge *Buras*, which is used for levee building along the Mississippi River and its tributaries. The equipment for lighting the dredge was designed and installed by S. J. Stewart (Electric), New Orleans. The boom of the dredge is 125 ft. long and is provided with two oblong "illuminators" shown in the illustration.

The house, which is octagonal in shape, is equipped with two illuminator head-lamps and four three-lamp clusters of 60-watt lamps on the outside. As the machine turns there is light on all sides. The base is provided with one five-lamp cluster of 60-watt lamps in the front, another in the back and six 16-cp lamps distributed at other points. Energy is supplied to all of these lamps through a sliding contact. The inside of the house is lighted with one three-lamp cluster of 60-

NIGHT VIEW OF U. S. DREDGE "BURAS"

watt lamps and twelve separate 16-cp lamps. All wiring is laid in steel conduit, and all circuits are controlled from a central switchboard. Energy is supplied by a 7.5-kw, 125-volt, 1000-r.p.m. direct-current generator, manufactured by the Robbins & Myers Com-

pany, Springfield, Ohio. The generator is belt-driven by a steam engine. The dredge was manufactured by the McMyler Interstate Company, Cleveland, Ohio.

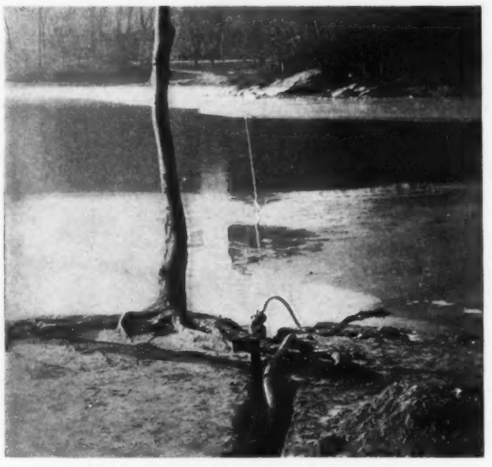
Underground Distribution in Central Park, New York

Central Park, New York City, which, as pointed out in these pages some time ago, is lighted with tungsten lamps fed from underground cables, has an unusually complicated distribution system. Electrically the park is divided into seventy-two circuits of from two to forty-five lamps each. As a general rule these are controlled from the first post on the circuit, but in some cases from city lamps conveniently placed. With this arrangement it is possible to turn the lamps on or off either at or near the park boundaries or at transverse roads, which arrangement has many operating advantages. Where convenient, opposite sides of a drive are lighted from separate circuits to increase the reliability of illumination. Double, steel-banded lead cables ranging in size from No. 00 triplex to No. 8 duplex are employed. Under and around the steel armor are wrappings of jute which protect the steel from moisture and the lead from contact with the steel. One of the chief advantages possessed by this cable is that it does not have to be buried more than 10 in. or 12 in. in the earth. It can also be submerged without additional protection.

The New York Edison Company's three-wire mains are tapped at convenient points on the outskirts of the park and cables, usually of No. 00 wire, are run to the control posts. Switches are generally placed in the main feeders, but in important sections of the park where fewer lamps are connected to each circuit branch circuit switches are employed. All of the switches are of the knife-blade type, one being installed in each positive and negative circuit. Each lamp has its individual fuse in addition to those in the main line, but none is employed in the neutral circuit.

BASE OF LIGHTING UNIT CONNECTED TO CABLE

In every post on duplex branch lines is installed a two-bar connection block which carries the lamp fuse. The lower bar is always neutral and the upper one is either positive or negative, depending on conditions. Three-bar blocks are employed on triplex feeders at heavily loaded branch points. As all connections are made inside the posts, no manholes or junction boxes are required. Wherever cables are installed under driveways which are liable to be torn up frequently they are inclosed in 2.5-in. pipe.



CABLE EXTENDING UNDER WATER

Letter to the Editors

Electrolytic Insulation of Aluminum

To the Editors of the Electrical World:

SIRS:—In both your interesting editorial in the Oct. 17 issue relating to the electrolytic insulation of aluminum and the paper quoted the possibilities of aluminum wire in large sizes for series-wound coils appear to have been overlooked.

In electrical machine design at the present day, and particularly in that section dealing with traction motors, there is a pronounced tendency to discard all insulating material of an organic or textile nature and to substitute substances as highly refractory as possible. In this connection, therefore, it is particularly interesting to note the progress made in Europe in the use of series-field coils of aluminum in which the adjacent turns are insulated only by the oxide formed on the surface of the wire. Such a coil would have excellent characteristics when operating under temperature conditions which would be fatal to ordinary insulating materials. Moreover, the process involved for forming the necessary coating of oxide is of the simplest nature. As a rule, the wire is passed through a warm alkaline solution and wound up while hot.

Some idea of the commercial practicabilities of aluminum coils can be gathered from the fact that they are in use on about fifty street railways in Europe, the city of Hamburg alone having adopted them exclusively some time since. As will be surmised, these coils have principally been used for rewinding motors of older types, but there has been found no insuperable difficulty to fitting them in machines of much more recent design, and in London several 125-hp motors equipped with aluminum coils are operating on one of the subways.

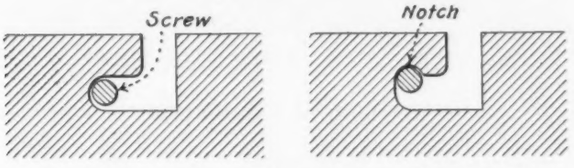
ERNEST V. PANNELL,
Electrical Department, British Aluminium Company, Ltd.
Toronto, Can.

Field of the Operating Engineer

A Record of Practice, Experience, New Ideas and Interesting Problems—Notes on Practical Subjects—Questions and Answers

To Prevent Loosening of Socket Shells

In sockets of the bayonet-joint type, particularly when equipped with keys and installed on bracket fixtures, the outer shells frequently become loosened and drop down, giving an unsightly appearance and exposing the live parts. Tightening the screws affords only temporary relief, for with the handling incidental to turning the lamp on and off a few times the shell may be again twisted so that it will drop out through the open slot as before. The trouble can be permanently



NOTCH TO PREVENT LOOSENING OF SOCKET SHELL

remedied, however, by cutting a little notch in the top of the bayonet-joint slot as shown in the accompanying sketch. This allows the screw to seat itself firmly in the notch, where it is adequately supported without the need for pressure on the part of the screws. A socket prepared in this way will hold firmly even after the threads have been worn from the screws by previous fruitless efforts to tighten the shell in place. The notch can be conveniently cut in the shell with the small end of a rat-tail file.

Case to Protect Knife Switches

BY J. G. KOPPEL

In places where exposed knife switches are a menace to life it is advisable to employ some sort of a protecting cover. Illustrated herewith are cases for inclosing single-throw and double-throw knife switches and the fuses usually installed therewith. The cover is pro-

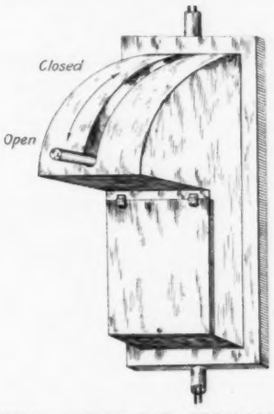


FIG. 1—PROTECTIVE COVER FOR SINGLE-THROW SWITCH AND FUSES

vided with a slot through which the switch handle is allowed to protrude. The base may be made of marble, slate or alberine fiber, the casing of the latter material, and the slotted cover of vegetable fiber lined with asbestos. To permit access to the fuses without having to remove the entire cover, a hinged cover of alberine

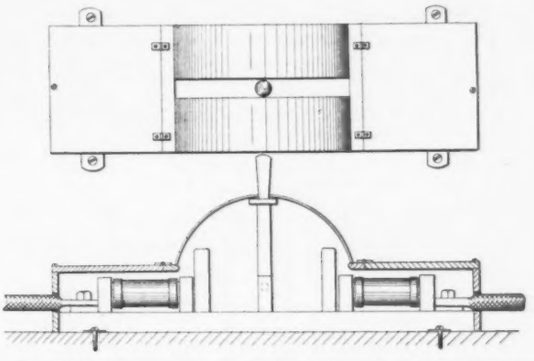


FIG. 2—PROTECTIVE COVER FOR DOUBLE-THROW SWITCH

fiber may be provided as indicated. Protective covers of this description are employed in several large industrial plants in Montreal, Quebec.

Protecting Induction Motors from Overload

To protect induction motors from continued overloads, such as are caused by a single fuse blowing in a polyphase circuit, a device can be used which operates on the principle of a fuse with a long time lag. As described before the Association of Edison Illuminating Companies at its recent convention, the device consists of a porcelain receptacle containing a heating coil surrounding a copper bar which projects from the coil and is used as a contact post. A spring contact set to spring away from the post when the heat, and consequently the overload, becomes excessive is fastened thereto by a fusible link. The terminals of the receptacle are fast-

TIME ELEMENT FUSE FOR PROTECTION OF INDUCTION MOTORS

ened to the stationary end of the spring and the copper post. The device is connected in series with the ordinary motor fuses, which need to be set only for short-

circuits. Owing to the long time lag of the heating unit, momentary heavy starting currents will not melt the link and open the circuit, but a continued overload will do so.

Improved Control Circuit for Vehicle-Charging Motor-Generator Set

While charging a vehicle battery or group of batteries through a motor-generator set an interruption in the source of the alternating supply may cause the direct-current machine to become the motor, delivering alternating current back to the line. Likewise the interruption of service on a single phase of the three-phase service may overload the motor end of the set. However, when protected by a wiring scheme similar to that shown in the accompanying illustration neither of these troubles can occur.

The armatures of current relays in each phase of the

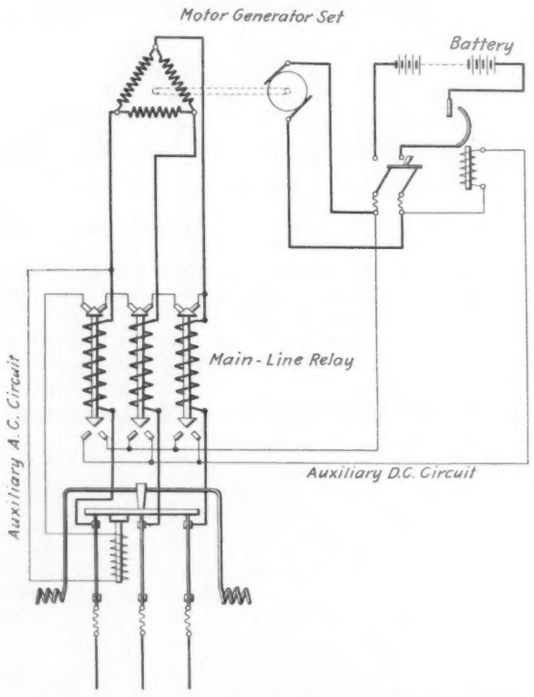


DIAGRAM OF WIRING FOR SECTION BATTERY-CHARGING SET

alternating-current service complete a local electrical circuit energizing a trip coil which holds the main-line switch closed. If any main-line relay becomes de-energized, the auxiliary relay circuit is immediately opened, thus releasing the spring-operated main-line switch.

More important, however, is the operation of the auxiliary direct-current circuit, which is completed by a main-line relay in the "down" position, that is, the position a relay would occupy when the phase in which it is connected is dead. Completion of this auxiliary direct-current circuit trips the single-pole circuit-breaker in the battery service and prevents direct current from the battery being used to drive the motor-generator set. Cases are on record wherein the alternating-current service failed during the night. Although an attendant was in the garage, he did not notice any trouble. However, when the drivers could not move their vehicles in the morning investigation showed that the batteries of the fleet had been delivering energy to the motor-generator during the greater part of the night instead of receiving it.

Patents on this wiring scheme have been taken out by Mr. Nels Joleen, of the Commonwealth Edison Company, Chicago.

Wooden Nozzle for Compressed-Air Hose

For blowing out bus chambers with compressed air, as well as for cleaning all kinds of electrical machinery in its plants and substations, the Middle West Utilities Company, Chicago, is making use of wooden nozzles on its air-hose lines. These nozzles can be introduced with safety near charged conductors and avoid the possibility of fatal shock which is present with the usual metal nozzles.

Where some of its disconnecting switches are remote from the oil switches controlling the same circuits red and green signal lamps operated from the switchboard pilot-lamp circuits are placed near the disconnecting switches. With these lamps as safeguards the attendant can assure himself of the condition of the circuit before attempting to open or close the disconnecting switch.

Burning of Commutator

We have a synchronous motor-generator set which recently became grounded at the motor collector rings, resulting in burning small holes in the generator commutator. The commutator is not grounded, but these holes collect dirt, which causes arcing between the brushes. How can this trouble be remedied?

G. T. M.

In order to restore this machine to satisfactory operation it will probably be necessary to turn down the commutator until a smooth surface is again reached. While several methods can be employed for filling such burned places with mica compounds, these are generally makeshifts, the filling usually being thrown out under the high centrifugal forces in the commutator. One plan is to cut a slot between the commutator bars for a short distance back on both sides of the burned places. Into the slot thus formed a piece of sheet mica is introduced and the remaining space at each side is filled with mica compound. With the aid of a chisel, copper from the body of the segments can be beaten over to wedge the filling, in some cases practically covering it. The presence of this insulating filling prevents the entrance of dirt which, by forming a short-circuit path between adjacent commutator bars, causes the sparking noted.

Design of Electromagnets

I wish to design a powerful electromagnet to be used for the quick closing of a door. Two such magnets will be operated in series on a 275-volt circuit. Please state the formula for the design of such a magnet.

J. F. D.

The maximum uniform pull of an open-circuit plunger magnet, measured in pounds, is expressed by the formula:

$$\text{Pull} = CA\frac{IN}{l},$$

where I is the current in amperes, N the number of turns, A the area of the core in square inches, l the length in inches, and C the pound pull per square inch per ampere-turn per inch. The last-named factor depends upon the proportions of the coil, the degree of saturation, the length, the physical character and the chemical purity of the plunger. Its numerical value as ascertained from practical magnet construction ranges from 0.009 lb. to 0.013 lb. per square inch per ampere-turn per inch.

Digest of Current Electrical Literature

Abstracts of Important Original Articles Appearing in the Periodical Electrical Press of the World

Generators, Motors and Transformers

Three-Phase Commutator Series-Motors. — F. VON KLEIST. — A mathematical article illustrated by diagrams in which the author gives formulas for the calculation of three-phase series commutator motors. Formulas which have been found reliable and useful in practice are given both for motors with a single set of brushes and with a double set of brushes. Numerical examples are added.—*Elek. Zeit.*, Oct. 8, 1914.

Large Induction Motors.—G. MOORES.—A continuation of his illustrated serial on some features of mechanical design of large induction motors. In the present instalments the author deals with stator frames and with rotor construction.—London *Elec. Review*, Oct. 9 and 16, 1914.

Railway Motor.—C. W. STARKER.—An illustrated description of the universal pressed-steel railway motor of the Westinghouse Company.—*Elec. Journal*, October, 1914.

Lamps and Lighting

Flicker Photometer.—HERBERT E. IVES AND EDWARD J. BRADY.—An illustrated article on a new design of flicker photometer for laboratory colored-light photometry. Three requirements should be fulfilled: First, the dividing line between the two fields which are alternated should be a line without breadth; second, the speed of alteration should be accurately adjustable, and, third, it should be possible to vary the relative brightness of the two fields quickly over a wide range with a minimum of physical effort. A flicker photometer head should be of the stationary and not of the movable type. The instrument is best described by reference to Fig. 1, which gives plan and sections. The photometer is

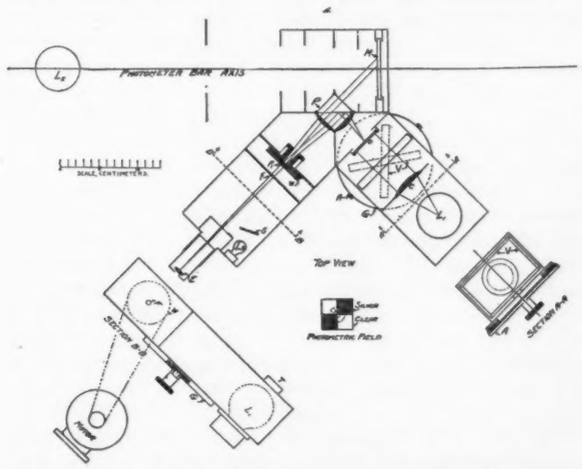


FIG. 1—PLAN AND SECTIONS OF FLICKER PHOTOMETER

planned to be used solely by the substitution method, so that while the test and standard light sources are carried successively at appropriate places on the photometer bar, the comparison lamp is held at a fixed position in the photometer body. Tracing the paths of the beams of light which ultimately reach the eye is the easiest way to understand the photometer's behavior. The light from the standard lamp L_2 falls upon the matte white surface M, thence a portion is reflected through the cube P and the small prism P_1 to the eye. The light from the comparison lamp L_1 passes through the lens C and thence through the variable neutral-tint screen V to the flashed opal glass O. Part of the diffused light of the latter enters the cube P and is reflected through

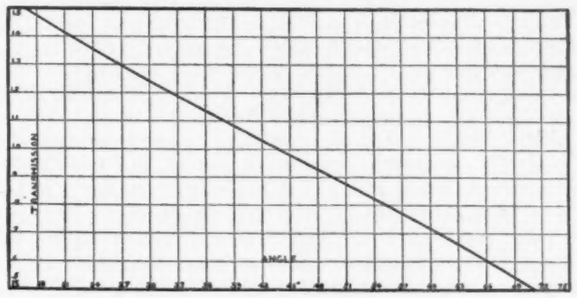


FIG. 2—CALIBRATION CURVE

the small prism P_1 to the eyepiece and eye at E. The mechanism for producing the alternation of the two illuminations is comprised in the cube P and the prism P_1. The cube is a modified Lummer-Brodhun. One of the component prisms is left untouched; the other is silvered and the silvering is cut away in the manner shown in the separate sketch of the photometric field. The small prism P_1, having an angle of 10 deg., is mounted in a collar W, which is rotated by the motor to which it is connected by a belt. The plate F, perforated by a central round opening of 2 deg. diameter, as viewed from the eyepiece, limits the actual area of the prism used. When the motor is running the beam of light which reaches the eye is, as it were, whirled around the axis of the instrument, alternately passing over the clear and the silvered parts of the cube P. The successive appearance of the openings at F are readily seen from the separate sketch of the photometric field, where the small circle represents the section of the beam coming to the eye from F. The practically invisible dividing line between the silvered and the clear portion of the cube and the smooth continuous motion of the prism P_1 insure the first condition considered above. The second condition above dwelt upon is secured by using a series-wound motor with a sliding resistor of variable resistance. The third condition—the easy variation of the relative illumination—is secured by the use of the variable neutral tint screen V. This consists of two opaque line gratings on glass slightly separated from each other. When rotated about an axis parallel to the lines the transmission varies with a rapidity determined by the separation of the glasses. This screen is rotated by a milled head which also carries the pointer A. The size of the milled head is such that it may be turned easily by the fingers. Small lamps to illuminate the scale are also provided but are not shown in the sketch, and the scale may be read either from the observer's side or else by an assistant viewing the other end of the pointer. The lens C is intended to help make the illumination on O uniform, and as a further refinement the cube P is furnished with a convex lens focused on

one spot of the opal glass *O*. A calibration curve of the screen in this particular instrument is shown in Fig. 2. It is practically a straight line over all the region which would be used. A novelty in this instrument is the means for illuminating the surroundings of the photometric field to nearly the same brightness, furnished by the small lamp L_2, which throws its light on the white walls of the compartment facing *F*. *S* is a small translucent screen for securing uniform illumination. This bright surrounding field materially contributes to the comfort of reading.—*Phys. Rev.*, September, 1914.

Generation, Transmission and Distribution

Long Three-Phase Transmission Line.—B. Soschinski.—The conclusion of his mathematical paper in which he shows that regulation for constant final voltage of high-tension feeder lines by means of synchronous motors at the end of the line is always economical. It is the more economical the greater the length of the transmission line and the power transmitted. Numerical examples are given.—*Elek. Zeit.*, Sept. 24, 1914.

Traction

Electrification of Railroads.—L. Pontecorvo.—An article on the electrification of the Italian Giovi line. This was brought about for the single reason that the capacity was insufficient and that by electric equipment it became possible to triple the capacity both by increase in speed and tractive effort. The three-phase system is used. Although the increase in capacity was the only decisive consideration, the results from an economic point of view have been far better than expected and have constituted for the Italian State Railway a very great success. A detailed examination made by the administration of the Italian State Railway has shown that the running expenses, including interest and depreciation on the investment, have been reduced 22.5 per cent, notwithstanding the fact that the electric energy is produced by a steam-electric plant and that the station capacity is not yet fully utilized. As regards the relative merits of the various systems, the Italian State Railways are sufficiently satisfied with the three-phase system to extend it to all their lines as conditions will require it. Having already in service 135 three-phase electric locomotives, of which 110 are of the Giovi type, with a total capacity of 2161,200 hp, they are considering the electrification of new lines not on theoretical considerations but from the results of actual experience. On account of the large increase in capacity of the lines through three-phase electrification, it will be unnecessary to double the track on single-track lines where the traffic is getting too heavy and where the expense of doubling the track would be very high; besides, on account of the elimination of smoke they will be able to improve greatly the service on lines with many tunnels as is the case on most Italian lines. To this will be added the advantage of a reduction in the running expenses and, by utilizing to a larger extent the hydraulic power not yet developed, they may reduce the importation of coal, which represents a heavy expenditure for the country. Again, it is not simply the large saving due to the characteristics of this system, such as the lightness of the locomotive and the regeneration of energy, but more especially the characteristic of maintaining high speeds on the up-grade with high efficiency, which determines the hauling capacity of the lines.—*Elec. Journal*, October, 1914.

Installations, Systems and Appliances

Direct-Current Motors for Variable-Speed Drive.—R. S. Sage.—The first part of this article is devoted to a brief discussion of the elementary principles involved in producing variation of speed in direct-current motors and shows why the commutating pole is a requisite in the design of motors to be used for wide speed ranges by the field-control method. After a short statement as to the general classes of industrial requirements, some space is given to a more detailed description of the three control systems and a discussion of their adaptability to the three general classes of requirements, the third method (field control) receiving special consideration. The concluding paragraphs deal with the subject of compound windings for motors of this class and close with the statement that the application of the commutating-pole adjustable-speed motor should prove of advantage in the majority of drives for variable-speed apparatus.—*Gen. Elec. Rev.*, October, 1914.

Wires, Wiring and Conduits

Insulating Materials.—A. Schwaiger.—An illustrated English translation of his German paper, noticed some time ago in the Digest, on a new method for testing the electrical properties of insulating materials and their ratings for quality by a series of characteristic curves.—London *Electrician*, Oct. 16, 1914.

Electrophysics and Magnetism

Seat of Light Action in Selenium.—F. C. Brown and L. P. Sieg.—There has been some uncertainty in the past as to the seat of light action in selenium. The present authors have succeeded in producing several forms of large crystals of metallic selenium, which have enabled them to determine several interesting facts concerning the seat of light action in selenium. The authors describe various observations which have led to the following results: The change of resistance by light is a property of the crystal and not an action taking place at the contacts. Illumination of different points along the crystal produces approximately the same effect at all places. The crystal is changed in conductance by approximately the same amount whether the illumination is on the side of the contacts or on the opposite side. From these results the authors draw the general conclusion that the light acts throughout the crystal and that the conductivity is almost uniform throughout the crystal. They then refer to evidence deduced from the law of superposition of intensities. They used two lamps in certain combinations and found that the two lamps acting together produce almost identically the same effect whether they act on the same side or on opposite sides. Moreover, there is an apparent spreading of light action. The authors produce evidence to the effect that the action of light in crystal is transmitted to a distance. There seems to be a new "action at a distance." If the rate of transmission of the action through the crystal can be determined, certain information may be obtained as to the nature of the mechanism of transmission. The possible processes that are suggested are electronic transmission such as exists in the flow of the electric current, transmission by the elastic vibration of the medium, and possibly by the interaction of parts of the atoms moving with velocities approaching that of light.—*Philos. Mag.*, October, 1914.

Time-Factor in Selenium Resistance.—G. E. Grantham.—It is well known that the electrical resistance of selenium does not reach an equilibrium value instantaneously after exposure to light, and the rate of change of resistance on exposure is much greater than the recovery rate. The problem suggested the use of a rotating disk from which sectors are cut to allow the light to fall upon the cell, the cell being in one arm of a Wheatstone bridge with some device for connecting a galvanometer in the bridge circuit at a known time interval after exposure. The author describes experiments made by this method. The relation between time and resistance for the preliminary experiment is shown

in curves. During the first hour the rate of change of resistance increases with the speed. During the remainder of the time the cell approaches the equilibrium resistance. This equilibrium resistance is the resistance of the cell at the time that the decrease on exposure is just equal to the increase in the dark. A discussion of the results is given on the assumption that selenium consists of three components.—*Phys. Rev.*, September, 1914.

Units, Measurements and Instruments

Direct-Current Ampere-Hour Meters as a Substitute for Watt-Hour Meters.—W. STRELOW.—An illustrated article in which the author gives an outline of the development of the designs of direct-current watt-hour meters and ampere-hour meters in the last twelve years. He then describes the construction of ampere-hour meters for two-wire and three-wire installations. They are provided with a friction compensation device making use of a small additional current of 3 or 4 milliamp (corresponding to a consumption of 0.4 watt per 100 volts). The author emphasizes that it is quite possible to design an ampere-hour motor meter which will read correctly even at the smallest loads and that it should represent a suitable substitute for watt-hour meters.—*Elek. Zeit.*, Sept. 24, 1914.

Testing Lubricating Oils.—An illustrated description of an oil-testing machine of British make which determines and automatically records the correlation that should exist between the machinery to be lubricated and the lubricating medium it is proposed to employ for the purpose. The apparatus forms a complete self-contained oil-testing and grease-testing plant, the equipment including a small high-pressure steam boiler and superheater, and it is so arranged that all tests are carried out under conditions which are in every respect the exact mechanical counterparts of the actual work to be done by the lubricants. To accomplish this the speed of the machine can be varied as required to produce the equivalent of from 50 r.p.m. to 3000 r.p.m., corresponding to a speed of the frictional surfaces of about 5 in. to 25 ft. per second. The range of pressure is from 1 lb. to 750 lb. per square inch, and the temperature can be increased from that of the frictional surfaces when at rest to 500 deg. C., which surpasses the heat of dry steam produced under the highest pressure. The recording mechanism indicates automatically and upon the same sheet of paper the degree of friction and the temperature of the frictional surfaces at various speeds. The curves are such that they also indicate the proportional thickness of the layer of oil required to maintain efficient lubrication at the given temperature, together with the comparative values of the oils in relation to their capacities for withstanding various temperatures. —London *Electrician*, Sept. 18, 1914.

Measuring Magnetic Flux.—P. LUDEWIG.—A description of laboratory exercises on the determination of the magnetic flux and the coefficient of mutual induction in university laboratories. After an outline of the theoretical foundations the author describes in detail how to calibrate a ballistic galvanometer and how to determine the distribution of magnetism in a magnet rod, the flux in a long primary coil by means of a short secondary coil, the mutual inductance of two coils, one of which is placed so that it can be revolved within the other, and the effect of an iron core on the flux.—*Elek. u. Masch.* (Vienna), Sept. 13 and 20, 1914.

Miscellaneous

Arc Welding.—E. S. ZUCK.—An illustrated article on the equipment required for electric arc welding. The author discusses successively the generating equipment, the electrode holders, protective coverings, welding materials and filling materials and points out the saving obtainable with electric weldings.—*Elec. Journal*, October, 1914.

Italy.—A review of the condition of the electrical industries in Italy in 1913. In various ways there have been decided improvements in conditions. Progress is being made in extending the sphere of electric traction on interurban and trunk railways.—*Elek. Zeit.*, Sept. 24, 1914.

Italy.—O. E. ALLO.—An article on trading in Italy, giving notes both on wholesale and retail trading in electrical machinery.—London *Elec. Review*, Oct. 16, 1914.

Book Reviews

SO THE PEOPLE MAY KNOW. A series of advertisements for the Toledo Railways & Light Company, written by Henry L. Doherty. Toledo, Ohio: Blade Printing & Paper Company. 52 pages. Price, $2.

This is a republication of statements published by Mr. Doherty in his campaign for a settlement of the franchise controversy between the city of Toledo and the Toledo Railways & Light Company, of which he is chairman of the board of directors. The spirit and characteristics of Mr. Doherty appear throughout the advertisements, which were effective agencies in so changing public sentiment in Toledo as to improve the position of the company materially.

COMMISSION REGULATION OF PUBLIC UTILITIES. A compilation and analysis of laws of forty-three states and of the federal government for the regulation by commissions of railroads and other public utilities. New York: National Civic Federation Distributors, Traffic Service Bureau, Chicago, Ill. 1284 pages. Price, $8.50.

This volume represents part of the work of the department on regulation of interstate and municipal utilities of the National Civic Federation. The work was begun in February, 1912. The division of the data by subjects makes the volume exceedingly useful for reference purposes.

TELEPHONE CONSTRUCTION, INSTALLATION, WIRING, OPERATION AND MAINTENANCE. By W. H. Radcliffe and H. C. Cushing, Jr. New York: The Norman W. Henley Publishing Company. 224 pages, 132 illus. Price, $1.

The 1914 edition of this book is intended, as was the first edition of 1908, to supply usable data to persons who may wish to install private telephone systems of various kinds. The first eighty-two pages are given over to the construction, operation and installation of telephone instruments, and beginning with the simplest magneto-phone and one-way microphone and battery circuits, lead the reader gradually into explanations of the more complicated series and bridging party-line layouts. Telephone line wiring, including pole setting, wire and cable stringing, conduit laying and the use of aluminum wire and concrete poles, is taken up in a section covering sixty pages. A short treatment of the simpler tests for continuity, crossed lines, grounds, etc., is followed by quite full descriptions of the wiring and operation of special telephone systems, including selective party lines and intercommunicating, automatic and manual exchange systems. The book is completed by an appendix containing definitions and wire tables and by a five-page index. It should prove very useful to the electrician who is unfamiliar with simple telephone practice and desires to find clearly expressed information compactly arranged.

New Apparatus and Appliances

An Illustrated Descriptive Record of Recently Developed Manufactured Products of Interest to Electrical Readers

Three-Heat Chafing Dish

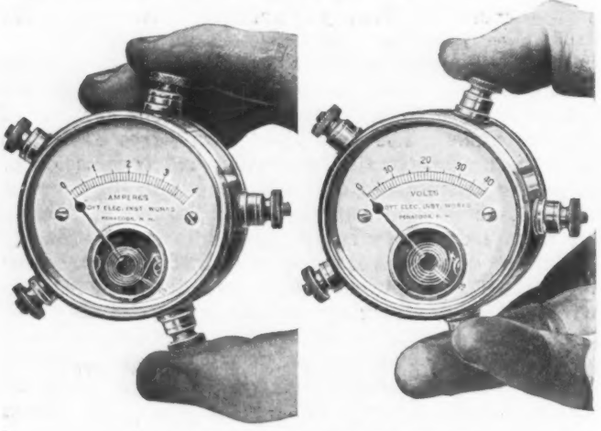
With the chafing dish shown herewith it is possible to obtain three gradations of heat. This is very desirable as some foods have to be cooked more slowly than others. The device is equipped with a food pan and a water receptacle, either of which can be clamped directly to the heating plate. It is declared that clamping the pans to the hot-plate increases the rate of heating about

CHAFING DISH WITH RECEPTACLE CLAMPED TO HEATER

30 per cent above that ordinarily obtained with other designs. The chafing dish, which holds three pints, is furnished with a silk conductor cord and an attachment plug. It is manufactured by the Simplex Electric Heating Company, Cambridge, Mass.

Pocket-Size Volt-Ammeter

A pocket-size instrument for indicating low values of voltage and current simultaneously is illustrated herewith. It consists of two complete instruments mounted back to back in a small cylindrical case, both faces of which are provided with a dial covered with plate glass. The device is only 2.25 in. in diameter and 1.25 in. thick. The pointers are operated by separate movable coil armatures pivoted on jewel bearings between the poles of permanent magnets. Voltages from 0 to 40 and cur-

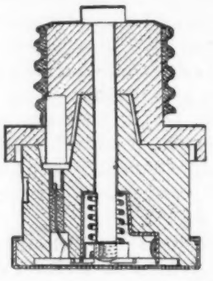


VOLT-AMMETER FOR THE POCKET

rents from 0 amp to 40 amp can be measured with this instrument simultaneously by connecting with the proper terminals, of which there are five. The instrument is manufactured by the Hoyt Electrical Instrument Works, Penacook, N. H.

Six-in-One Fuse Plug

A fuse plug containing six fuse links which can be used in succession before the plug has to be refilled is shown in the accompanying illustration. When one link burns out it is only necessary to turn the head of the

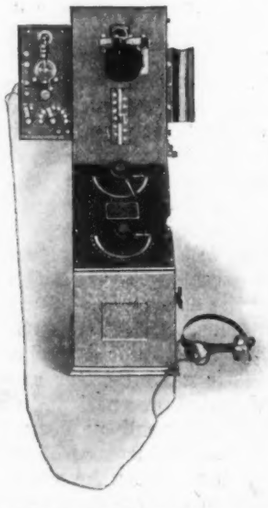


INTERNAL-COMBUSTION FUSE PLUG

plug through 60 deg. to connect a new fuse in circuit. Marks on the head of the plug show when a new fuse is connected and indicate how many are left for service. The plugs can be screwed into a standard lamp socket. They are manufactured by C. C. Balassa, 17 Battery Place, New York City.

Radio-Telephone Set

One of the features of the wireless-telephone apparatus developed by the De Forest Radio Telephone & Telegraph Company, 101 Park Avenue, New York, is its simplicity of operation, and it is declared that any in-



WIRELESS-TELEPHONE WALL SET

telligent person after a few instructions can manipulate the set. The entire apparatus except the motor, generator and transformer is mounted on the wall as shown in the accompanying illustration, the outside dimensions being 33 in. by 9 in.

The receiving apparatus is placed beneath the transmitter cabinet. The base of the cabinet containing the receiving apparatus projects 21 in. from the wall. The secondary condenser dials and primary inductance switch are mounted on a hard-rubber panel which is inclined at a convenient angle so that the speaker standing or seated can easily see and adjust the receiving circuits. The receiving tuner is designed to be sharply selective in order to minimize any danger of interference from outside stations. The slide switch on front of the transmitter cabinet is used for tuning a given antenna to the transmitter wave-length which is employed.

Ordinarily only one transmitter wave-length is necessary at a given point so that when the apparatus is once set for this wave-length no further adjustment is needed. The detector is shown on a little case on the left side of the transmitter cabinet. It is connected to the receiver tuner below. A small storage battery supplies energy for lighting a small lamp, the circuit of which is opened whenever the "listening key" is depressed for talking. Thus the detector automatically indicates the condition of the set whether switched in for talking or listening. Sets rated at 2 kw and 5 kw are being made.

Permeability Testing Outfit

An outfit for obtaining magnetization and hysteresis curves of straight rods, sheet-metal strips, transformers and other working samples of magnetic material has been placed on the market recently by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The complete equipment consists of a galvanometer, an adjustable mutual inductance, resistors, batteries, switches and sample-holding yokes.

The yokes for holding the straight rods are essentially the same as for sheet material, the only difference being the shape of the opening through the coils and the iron clamps at each end. The yoke shown in Fig. 1 consists of two separate solenoids mounted parallel to each other. The clamping yokes at the ends of the solenoids are arranged so that when clasped on the ends of the sample a closed magnetic circuit is obtained.

The variable mutual inductance illustrated in Fig. 2 consists of a stationary primary coil and a movable secondary coil whose relative positions can be varied by a long screw projecting through the top of the metal case. Attached to the head of the screw is an indicating pointer. The mutual inductance can be furnished calibrated in millihenries of magnetic linkage.

Seven adjustable resistors are required with the complete outfit. Three of these are of the double-throw switch type, of which two have one sliding element to give finer adjustment. Two are of the potentiometer type, one of the sliding type and one adjustable by means of taps.

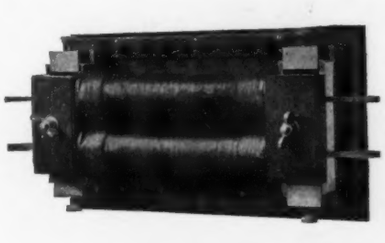
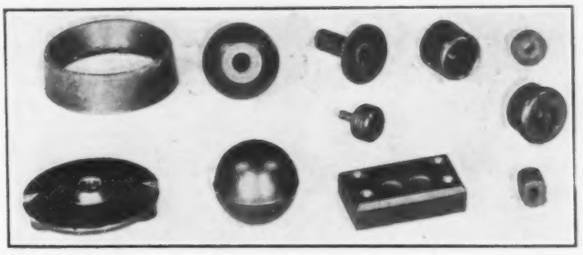


FIG. 1—SAMPLE-CLAMPING YOKES AND MAGNETIZING COILS

FIG. 2 — VARIABLE INDUCTORIUM

Synthetic Gum Insulating Material

"Redmanol" is the name given to a synthetic gum manufactured by the Redmanol Chemical Products Company, 636 West Twenty-second Street, Chicago, which mixed with various fillers is being introduced as an insulating material for electrical apparatus. The pure material is of high dielectric strength and insulating qualities. It is practically non-combustible but softens when heated, although it does not melt. The material itself is made from phenol, cresol and hexamethylene tetramine and is furnished in powder, granular and sheet form. Mixed with an organic filler redmanol has a specific gravity of about 1.33; with inorganic mixtures its specific gravity is about 1.85. The pure synthetic gum displays a tensile strength of 7500 lb. per sq. in. It is unaffected by chemicals or acids and has the properties of rock amber, including that material's ease of electrification. Already redmanol has been applied to many uses as an electrical insulating material. A number of these applications are shown in the accompanying illustration. The material has also been employed for commutator rings, telephone instrument and switchboard parts, magneto generators, hand flashlamps, etc. As manufactured into sheets and other forms, redmanol is furnished by the Formica Insulating Company, 3240 Spring Grove Avenue, Cincinnati, Ohio. The insulating material can, for example, be formed readily and accurately around copper conductors. Tubular cases for battery flash-lamps are made with wires scarcely less in diameter than the thickness of the case walls, perfectly embedded in the walls, but separated by thin layers of insulation from both the inner and outer surfaces.



PARTS MADE FROM SYNTHETIC GUM INSULATING MATERIAL

Washing Machine with Swinging Wringer and Agitator

One of the latest and most improved washing machines made by the Grinnell Washing Machine Company, Grinnell, Ia., is shown in the accompanying illustration. Among its chief features are these: No part of the mechanism is rigidly attached to the tub, so that the agitator and wringing apparatus can be used with the bluing and rinsing tubs; when the tub cover is raised the agitator, or dolly, carried by it is automatically disconnected from the driving mechanism; a silent-running planetary gear connects the motor with the dolly and wringer, and emergency release levers are in easy reach. The tub support is a frame made of angle irons rigidly braced and resting on casters. Inside the frame and at one side is attached the driving motor, which is waterproof and dustproof and rated at 0.1 hp. If it were not for the starting current, the manufacturers declare, a 0.05-hp motor would be sufficiently strong to operate the washer. Connected with the motor by a belt drive inclosed in a woven-wire guard is a flywheel carrying the planetary gears, which

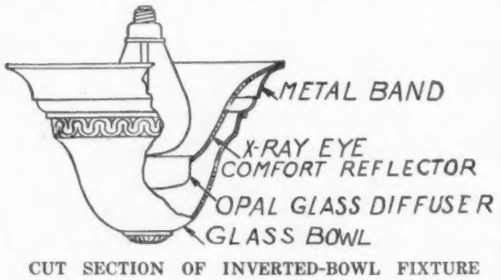
give a reduction in speed of five to one. The pinion is made of laminated steel and fiber, which prevents noise. A shaft connects the flywheel with a vertical shaft on the opposite corner of the frame, where the wringer and tub-top are supported. A wooden doily is employed to

WASHER WITH PLANETARY GEAR DRIVE

agitate the clothes. It is attached to a telescoping post, which can be raised, without shutting off the power, in order to permit the agitator to take a new hold on the clothes. The wringer rolls are equipped to feed in either direction or be separated in an emergency. Either wooden or metal tubs are furnished. The wooden ones are made of Louisiana swamp cypress or Virginia white cedar finished in the natural color and coated with waterproof varnish. The tubs can be easily replaced without disturbing the rest of the washer.

Fixture for Gas-Filled Lamps

A direct-indirect fixture designed to accommodate gas-filled lamps has been developed by the National



CUT SECTION OF INVERTED-BOWL FIXTURE

X-Ray Reflector Company, 235 West Jackson Boulevard, Chicago. It consists of a silvered-glass reflector fitting snugly in the mouth of an inverted bell-shaped glass bowl which is softly illuminated by light passing through the bottom of the reflector. This opening is closed by an opal-glass diffuser. The outer bowl is supported from a single pendent chain by three arms at its lower end. These are attached by spring clips to the metal rim on the glass bowl. With this construction it is simple to clean the fixture as any dust that may work past the joint between the reflector and bowl may be removed by detaching one arm and allowing the bowl to swing downward from the other two as hinges. As the inside of the reflector is fire-glazed, dust collecting thereon may be removed easily with a dry cloth.

DIRECT-INDIRECT FIXTURE FOR GAS-FILLED LAMPS

The fixture is ordinarily furnished to accommodate 300-watt lamps, but it can be equipped with a mogul socket for 400-watt or 500-watt lamps.

Water Heater

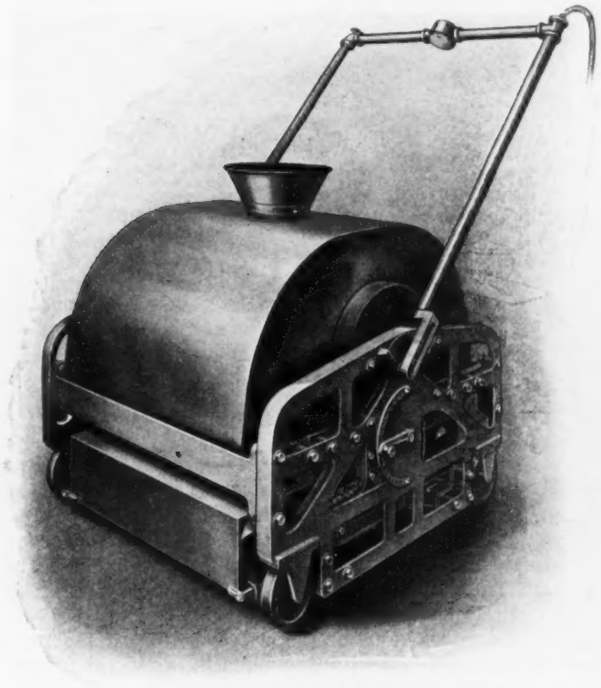
An electric water heater which can be attached to any sink, wash-bowl or bath-tub faucet is illustrated herewith. By turning the faucet to the right cold water is obtained and by turning it to the left hot water flows from the spigot. Besides developing heat it is declared that electricity is made to sterilize the water. The device eliminates running special hot-water pipe

ELECTRIC WATER HEATER ATTACHED TO WASHBOWL

through a house. It is manufactured by the Geyser Electric Water Heater Company, 42 Hudson Street, New York City.

Electric Floor-Scrubbing Machine

A motor-driven floor scrubber, which, it is declared, will do as much work as eight men and will effectively scrub from 6000 sq. ft. to 8000 sq. ft. of floor an hour, is being made by the Sanitary Scrubbing Company, 140 Liberty Street, New York. The scrubber is equipped with a tank for clean water and tanks for receiving the dirty water which is swept up by a 16-in. horizontal brush revolving at a speed of about 600 r.p.m. The water supply is regulated by a valve on the handle and is fed through a pipe directly in front of the brush. The brush sweeps the water into a tank, leaving the floor very nearly dry after the machine has passed over it. Two types of scrubbing machines are being made, one for large unobstructed floor areas and the other for small spaces. The larger machine is equipped with a supply tank containing 15 gal. of water and two tanks for soiled water. This machine is operated by a 0.25-hp motor and may be moved either forward or backward. The smaller machine is equipped with an 8-gal. supply tank and only one tank for dirty water. This machine is also operated by a 0.25-hp motor, but can be moved in only one direction. A Crocker-Wheeler motor is used to drive these scrubbing machines.

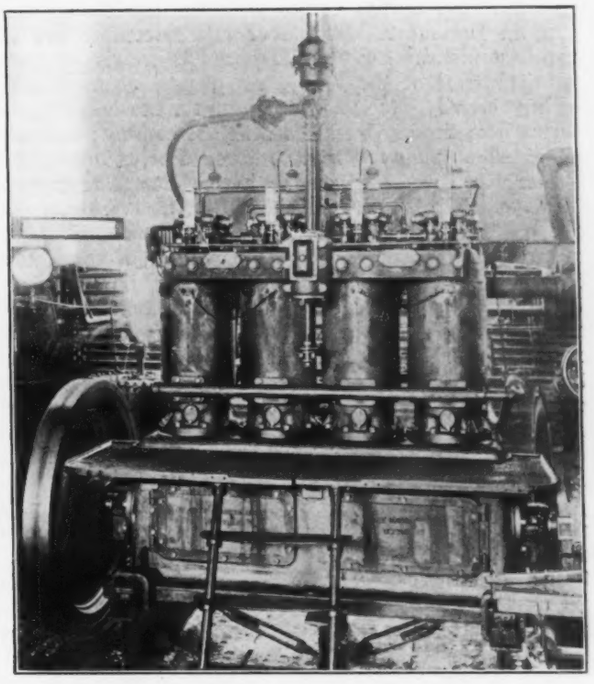


MOTOR-DRIVEN SCRUBBING MACHINE

Steam as the By-Product of Gas Engine

When the water in the jackets of an internal-combustion engine of the water-cooled type is raised above a certain temperature (usually about 150 deg. Fahr.) bubbles tend to gather along the jacketed surfaces and greatly hinder the transfer of heat from the cylinder to the water. By increasing the velocity of the water flowing through the jackets the bubbles are removed before they become very large and not so much interference is offered to the conduction of heat through the cylinder walls.

A series of tests were recently made on the 150-hp four-cylinder vertical engine shown in the accompanying illustration by the Bruce-Macbeth Engine Company, Cleveland, Ohio, to determine the effect of increasing the velocity of the jacket water above that usually employed. A centrifugal pump was used to force the water through the cylinder jackets, from which it passed into an inclosed tank which was in turn connected to the suction side of the centrifugal pump. The velocity of the water was maintained at from five to ten times that ordinarily used. It was found that a pressure of 50 lb. per sq. in. was produced, which is equivalent to a temperature of 297 deg. Fahr. In connection with an exhaust-gas boiler much of the heat usually lost through the exhaust and the jacket water can be saved by such a system, and the steam generated can be used for heating purposes, steam jacketing and similar work.



GAS ENGINE FROM WHICH STEAM WAS OBTAINED

A system similar to that described above is used in the Younglove Building, Cleveland, Ohio. The installation consists of three gas engines, which are connected to one centrifugal pump and one expansion tank. A steam coil leading from the latter is connected to another tank, from which the hot-water supply for the building is obtained.

Drive and Pull Anchor

The guy anchor shown herewith consists of a ⅞-in. square steel rod 5 ft. long, equipped with four steel barbs. The barbs are made of two pieces, the upper strips being held rigid by the lower. Both these strips and the rivets which connect them to the shaft are hot-galvanized. The upper end of the rod is formed into an eye 1 in. in diameter. The weight of the anchor complete is 20 lb. It is driven into the ground by means of a sledge hammer. On being pulled out the barbs spread, thus insuring a substantial resistance.

This drive and pull anchor is being manufactured by the Barbed Anchor Manufacturing Company, whose works are in Louisville, Kentucky.

Jobber, Dealer and Contractor

Thanksgiving Display Suggestions

By A. J. Edgell*

November is the month during which the dealer in electrical merchandise should pave the way for the big business that always comes with the Christmas shopping in December. November and December are the two best months for the merchants in nearly all lines; it is the time of the year when people are most likely to buy heavily. It is all very well for the dealer to look forward to the big business which is coming; it is also an excellent plan for him to force the buying a little by early activity, particularly in the matter of window displays. Whether he has been a trifle lax about this phase of publicity or whether he has taken advantage of the possibilities of the show window, a little extra effort at this time will bring surprisingly big results.

Displays are most effective when artificially lighted, as they stand out from their surroundings and the merchandise can be clearly seen. Displays at this time of the year are probably more effective than at any other period, one reason being that the lamps are turned on an hour or so before the close of the day's business and hence the desire created by the display can be fulfilled by an immediate purchase.

The devices themselves appear the same at all times, and it is by means of attractive arrangements or some decorative feature that the display can give them a different appearance. The decorative feature serves to arrest the attention and the attractive arrangement holds the attention and assists the display in making sales. This "setting," as it is sometimes called, although it may consist only of grouping some artificial flowers or leaves, should, of course, be seasonable. During early November artificial autumn leaves and drapings of bright colors serve very well.

The coming of Thanksgiving offers an opportunity for the display of cooking appliances with seasonable symbols as decorative accessories. While the turkey has been used very frequently for such purposes, there is no other feature which conveys the Thanksgiving idea quite as well. Therefore the suggestions show two ways of using the turkey as a background feature.

FIG. 1—THANKSGIVING WINDOW DISPLAY

These turkeys may be painted in colors or black and white. They can be obtained at small cost from a sign maker or may be cut from crêpe paper, such as comes with the turkey, painted in colors. In the latter case the cut-out should be mounted upon stiff cardboard.

*Society for Electrical Development, Inc.

In suggestion No. 1 artificial autumn leaves and chrysanthemums (these can probably be borrowed from a department store) are grouped in an attractive manner and fastened under the turkey. A large bow of crêpe paper or ribbon of brown or deep yellow, or both, is carried from the stems of the flowers and leaves to the floor. A center unit arrangement of devices is also

FIG. 2—ANOTHER SEASONABLE DEVICE

shown, and some of the devices are placed on a wooden or glass shelf supported by a pedestal. The showcard reads, "The Thanksgiving feast will taste better if cooked electrically."

The second suggestion shows the turkey mounted upon a large circle and surrounded by artificial foliage of autumn colors, with a fruit pendant hanging at either end. A different grouping of devices is shown. The pedestals and floor are draped with dark green velours, sateen or other material. The showcard reads, "Make *this* an electrical Thanksgiving."

"Leaks"—Some Lessons for the Electrical Dealer

Some of the "leaks" in a retail store which, though individually small, may amount to a good many dollars' loss in the aggregate are enumerated as follows by Mr. H. F. Frasse, purchasing agent of the Brooklyn Edison company, whose experience has included a number of years on both sides of the sales game:

"Being out of standard goods.

"Allowing customers to ask to be served.

"Saying 'Well?' to a customer instead of greeting him cordially.

"Continuing to talk to clerks instead of ascertaining customers' wants.

"Talking politics and ventilating one's own opinions regardless of those of customers.

"Making promises to have goods on a specified date and failing to do so.

"Keeping antiquated stock on shelves, instead of placing it on a special-offer counter.

"Trying to force a fly-specked or deteriorated stock on customers instead of sending it to auction.

"Burning gas when electricity is a better servant and does not vitiate the air.

"Operating machines by hand or foot when an electric motor does quicker work and gives time to occupy oneself elsewhere.

"Using too much string and wrapping paper.

"Employing cheap help.

"Neglecting to keep constant inventory.

"Failing to advertise."

Industrial and Financial News

Public Utility, Commercial, Corporate and Trade Developments—The Electrical Material and Security Markets

Large Electric Sign for Pittsburgh.—The A. & W. Electric Sign Company, Cleveland, Ohio, recently completed the erection of a large electric sign for the Miles Theater, Pittsburgh, Pa. The sign is about 50 ft. by 20 ft. and is of steel construction. It is lighted by 650 lamps. The sign weighs about 1000 lb. and is placed directly over the entrance of the theater.

Orders for Insulated Wire.—The Habirshaw Wire Company, New York, recently secured an order for supplying the insulated wire to be used in the Parkway Central Office Building, Philadelphia, the electrical contractor being the L. K. Comstock Company, New York, and also that in the Grand Central Telephone Building, Pittsburgh, for which the electrical contractor is the Thompson-Starrett Company, of New York.

Exide Battery Used Exclusively by Detroit Automobile Manufacturer.—The Electric Storage Battery Company, Philadelphia, reports that the Saxon Motor Company, Detroit, Mich., has adopted the Exide battery as a standard for electric starting, lighting and ignition. The type adopted measures 9.25 in. long by 7 13/32 in. wide by 9.125 in. high, weighs about 46 lb., and is capable of delivering 93 amp for a period of twenty minutes.

Electric Time-Recording Outfit.—The Gisholt Machine Company, Madison, Wis., has developed a time-recording set which consists of a clock, switching apparatus and one or more registering machines. The "Periodograph," as it is called, operates on either direct current or alternating current. The outfit was first designed for use in the company's erecting department. The apparatus has been on general sale for about a year, and in that time forty-five concerns have installed the system.

New Wireless Station for Oregon.—The Marconi Wireless Telegraph Company has started preliminary work on the erection of a new wireless station on the south side of Young's Bay near Astoria, Ore. The new plant is to be the most powerful on the coast north of Bolinas Bay and is to have a 25-kw equipment capable of sending a distance of 3500 miles at night. Four self-supporting steel towers are to be erected, each 10 ft. by 10 ft. in plan at the base and 300 ft. high. The towers will be placed at the corners of a 300-ft. by 600-ft. rectangle, which is to be the size of the aerial. The completed station is to cost from $70,000 to $80,000 and will have a working force of four men, a chief and three operators.

Build Electrical Power Plant for Gas Works.—The Laclede Gas Light Company, St. Louis, Mo., has completed plans for building a 1000-kva electric station to supply energy for new fifty-six-oven gas works. Two Westinghouse 500-kva, 4150-volt, three-phase, sixty-cycle turbo-generators will compose the prime mover equipment, and the steam end of the station will consist of three 500-hp Edge Moor boilers with their auxiliaries. Lines throughout the plant will be laid in underground ducts. Most of the motors will operate on alternating current at 440 volts, but the gas-oven-charging machines will be driven by 250-volt direct-current motors receiving energy from a motor-generator set. It is expected that the plant will be placed in operation some time in July, 1915.

Metal Company Taking Cotton in Payment for Its Products.—The Frictionless Metal Company, Chattanooga, Tenn., is sending a form letter to more than 3000 merchants in the cotton states who sell farm implements, hardware, etc., proposing to sell its "frictionless" metal in lots of 300 lb. or more and accept cotton in full payment. The cotton is to be taken at a rate of 10 cents per lb. and is to be insured and stored free for a period not more than six months, invoice and warehouse receipt showing insurance to accompany orders for the product. This offer, it is claimed, should cover at least 500 bales of cotton, which, added to 100 bales which the above company has already purchased, will help the dealers who by necessity will have to take cotton instead of cash in payment for their goods.

Kansas Small Towns to Receive Electric Service.—Mr. W. W. Finney, Emporia, Kan., has signed a wholesale energy contract with the Emporia Railway & Light Company and will distribute purchased electricity to Hartford and Neosho Rapids, Kan. This project will require the construction of 17 miles of 6600-volt transmission line, which, it has been decided, will be built on 25-ft. and 30-ft. poles bearing standard electric-light cross-arms and 15,000-volt insulators. The initial connected load will consist of 100 residence customers in Hartford, thirty in Neosho Rapids, and street lighting in both places. Later an effort will be made to serve prosperous farm communities through which the line passes. Mr. Finney has been supplying telephone service in Emporia, Hartford and Neosho Rapids for several years.

Electric Desk Calculating Machine.—Office appliances operated by electricity are constantly increasing as the result of the demands of modern business for speed, accuracy and efficiency in the handling of office work. One of these appliances, an electric desk machine for adding, multiplying, subtracting and dividing, was exhibited at the recent Business and Efficiency Show in Chicago and attracted considerable attention. It is made of steel and aluminum, weighs approximately 40 lb. and occupies a space 13.5 in. by 17 in. A 1/12-hp Holtzer-Cabot motor is used to operate the machine. When not in use the circuit is automatically opened. This machine is similar in operation and design to an electric calculating machine attached to a tubular-steel stand equipped with castors, which was described and illustrated in the *Electrical World* of Nov. 29, 1913.

Motor Manufacturers' Sales Convention.—The annual convention of the branch house managers of the Robbins & Myers Company was held at Springfield, Ohio, Oct. 19-24. In addition to the managers, one or two salesmen of each branch house were in attendance. The time which was not devoted to the general assembly was set aside for personal conferences by the different branch managers with the various departments of the factory organization. A schedule was prepared showing the branch managers the time assigned them for consultation with each department. In this way a great deal of time was saved in arranging dates and every manager had an uninterrupted session with each department. The general conference was opened Wednesday morning by a discussion on fans. Thursday morning was devoted to a discussion on motors. Thursday afternoon Mr. Kettering, of the Dayton Engineering Laboratories Company, addressed the assembly. Friday morning was given to talks on credits and advertising. Motion pictures of the company's factory in operation were also shown.

New Boston Edison Contracts.—The Edison Electric Illuminating Company of Boston, Mass., has obtained contracts from the New York, New Haven & Hartford Railroad to replace isolated plants with central-station service at the Back Bay Station and at the South Boston freight terminal. About 200 hp in connected load is involved in the former case and an equal amount in the latter, which includes battery-charging facilities for electric trucks used in the handling of freight at the terminal, motor load and lighting. Electric lighting will also supersede gas in the company's repair shops on Camden Street, Roxbury. The cost of operation in these plants will be cut about 40 per

cent by central-station energy. To the Edison company has also been awarded the contract for electric service to the extent of 325 kw in the new 500-ft. Custom House tower which has been erected on the Boston waterfront. Other recent contracts include 800 hp in motors, with other electric service, at the new Allston plant of the Carnegie Steel Company, 300 kw connected load at the new factory of the United States Oxygen Corporation in East Boston, 200 kw for the Milford & Uxbridge Street Railway, and the discontinuance of isolated plants in a number of office buildings.

Washington-Philadelphia Electric-Vehicle Tour.—An effective demonstration of the touring capabilities of modern electric vehicles was afforded by a trip from the Capital City and back again of several Washington delegates of the Electric Vehicle Association of America to the recent convention in Philadelphia. Driving two Baker electric victorias, Mr. F. T. Kalas, Washington representative of the Electric Storage Battery Company, and Mr. C. M. Marsh, secretary of the Washington Section of the association, accompanied by Mr. J. J. Bartram, Mr. H. B. Hart and Mr. E. S. Marlow, of the Potomac Electric Power Company, left Washington at 7 o'clock Saturday morning to make the 160-mile trip to Philadelphia in two days. Luncheon was eaten at Baltimore, where the vehicles received a short "boosting" charge, and in the afternoon the journey was continued via Towson, Md., to Havre de Grace, where the machines were put on charge for the night. Early Sunday morning the tourists continued via Perryville and Elkton to Wilmington, where batteries were again charged. From Wilmington via Chester to Philadelphia was an easy run, Philadelphia being reached at 4.30 p.m. The trip was noteworthy both for its length, which is unusual for electric vehicles, and for the fact that the machines were purely stock models equipped with 28-cell MV-9 "Ironclad-Exide" batteries. After attending the three-day session of the E. V. A. convention, the tourists returned over the same route.

Exhibits at the Boston Electric-Vehicle Salon.—Seventeen electric passenger cars were exhibited at the electric-vehicle salon in the ballroom of the Copley Plaza Hotel, Boston, Mass., this week, in addition to battery accessories. Special interest was aroused by a five-passenger coupé shown by the Buffalo Electric Vehicle Company, Buffalo, N. Y., which was described in the *Electrical World* of Sept. 26, 1914. This car was exhibited for the first time at the Boston salon. S. R. Bailey & Company, Boston, showed a Model F roadster. The Waverley Company, Indianapolis, Ind., showed several 1915 models, including a four-chair brougham with sloping-front battery box of graceful design, a front-and-rear-drive brougham and a "silent" limousine. The Ohio Electric Car Company, Toledo, Ohio, showed a five-passenger brougham, 1915 pattern, with stream lines in the body design, hand-hammered aluminum roof, panels and mudguards, worm-gear shaft drive and mechanical window lifts. The Anderson Electric Car Company, Detroit, Mich., featured a new three-passenger cabriolet. This car is designed so that the top may be raised in inclement weather, offering the pleasures of an open roadster at other times. It has a speed range of from 5 miles to 20 miles per hour and is provided with three sets of brakes, aluminum panels and battery hoods, a 100-in. wheelbase. locking operating levers and Lanchester worm gears. The company also showed a worm-gear-driven brougham with optional wire wheels and a Jacquard broadcloth interior finish and three other standard cars. In all the latest designs the chassis is the same. and all the rigging and control are carried on the chassis. A refinement recently applied to the Model 51 brougham is a narrow rain-drip over the doorway. The Rauch & Lang Carriage Company, Cleveland, Ohio, showed five cars of the roadster, coach and brougham types. Recent features incorporated in these are electric horns, metal mudguards and optional wire wheels. The exhibits of the battery manufacturers included the latest standard equipment. The Edison Storage Battery Company, Orange, N. J., showed a new button suspension for cells, the button being spot-welded on the side of the cell and affording increased reliability of service. The Electric Storage Battery Company and the Philadelphia Storage Battery Company, both of Philadelphia, displayed cells in section and assembled.

Corporate and Financial

Notes Retired in Advance.—According to an announcement made by H. M. Byllesby & Company, the Standard Gas & Electric Company has already paid off $250,000 out of a total of $500,000 in collateral-trust 6 per cent notes maturing June 1, 1915.

Investors Seeking Public Utility Stocks and Bonds.—Messrs. Williams, Dunbar & Coleman, of New York, in their weekly review state: "The earnings reported by the Pacific Gas & Electric Company for September show an increase in gross and a large increase in net, and since the first of the year the gains have been most impressive. The reports this last week also from the Cities Service Company, the Byllesby properties and other public service corporations show increases and prove conclusively the stability and underlying earning power of this class of quasi-municipal corporations. The better feeling produced by these earnings statements has been revealed in a renewed inquiry for public utility stocks and bonds by investors."

Public Utility Bonds for Savings Banks.—At the recent American Bankers' Association convention Mr. A. M. Harris, of Harris, Forbes & Company, New York, presented a paper on "Savings Bank Bonds in the Light of Recent Developments," in which he said: "To my mind one of the most significant developments in savings-bank bond requirements is the recognition of public service corporation bonds. While telephone and street railway are undoubtedly excellent additions, there is warrant for the assertion that they do not comprise exclusively the best in the public utility field. The principal other classes of public service corporations are gas, electric light and power companies, including the increasingly important hydroelectric developments. The best representatives of these public utilities furnish a most stable basis of security. Practically unaffected by industrial depression and practically free from the ill effects of competition by the fact of their being natural monopolies, the leading public utilities of this country have grown rapidly in favor with conservative investors during the last ten years. Banks other than savings institutions, as well as private investors, are now among the largest purchasers of the bonds of such companies. Their admission into the savings bank eligibility class is, therefore, a natural step."

Advantages of Present Bond Market.—Lee, Higginson & Company, of Boston, Mass., in a review of the bond market say: "The fact is that after every period of acute financial strain the financial centers have always worked back to normal monetary conditions. If the volume of the world's business is too large compared with the world's available capital, then the two must be readjusted. High money rates are a spur to saving and tend to increase the world's capital. High money rates and the accompanying credit disturbance cause rapid business contraction, and thus the volume of business becomes adjusted to the supply of capital. Undoubtedly there will be some foreign selling, but we think the average foreign investor will be strongly inclined to retain his investments in this country as promising perhaps a higher degree of safety and possibly also less subject to war assessments. It is estimated that in normal times England invests in foreign countries about $1,000,000,000 a year. No doubt the amount of English money seeking investment in foreign countries will fall off this year, but the percentage of this investment fund coming to this country we think is more likely to be increased than diminished. We think the English purchases of American bonds will exceed the sales. We might add that so far our London house has transmitted to us substantially more orders to buy than orders to sell. We shall be prepared to take back a reasonable number of our securities at less than original cost and ought to reap a reasonable profit by so doing. In our opinion, the effects of the European war will long be felt in this country, but the investor who is in the habit of buying interest-bearing obligations should not permit the pessimistic talk by the manufacturer or merchant about his lessened business and diminished profits to prevent him from placing his money at interest. The experience of all hard times shows that it is the idle money resulting from diminished business which enhances the value of safe, interest-bearing securities. In our opinion, the investment fund seeking good interest-bearing obliga-

tions is not less than normal but more. The supply of good, interest-bearing investment securities is not more than normal but less. We expect, accordingly, to see prices for good investment securities rise during the next few months. We strongly advise the purchase of sound interest-bearing securities now."

Annual Report of Baltimore Company.—The annual report of the Consolidated Gas, Electric Light & Power Company, of Baltimore, Md., for the year ended June 30, 1914, shows the operations of the company to be as follows: Gross income, $6,400,896; operating expenses and taxes, $3,333,822; net earnings, $3,067,074; fixed charges, $1,567,689; net income, $1,499,385; dividends paid and payable, $891,562; surplus, $607,823; reserves for depreciation and special reserves, $585,000; net surplus, $22,823. Compared with the previous fiscal year, the gross income shows an increase of $285,923, or 4.7 per cent, and the net earnings a decrease of $84,718, or 2.7 per cent. This latter condition was due to a rise in cost of gas, oil, large increases in taxes, and a reduction in rates starting July 1, 1913. The electric division showed a gain of 9.7 per cent in income from energy sales, a gain of 30.5 per cent in output, and a gain of 14.7 per cent in customers. Since May 1, 1913, $3,987,323 par value debenture shares have been sold, against which has been deposited $4,636,000 par value collateral. During the year $1,416,000 par value common shares were sold. The shareholders of the company increased during the year 37.5 per cent.

The Investment Situation.—N. W. Halsey & Company, of New York, in a bond circular expressed the following opinion regarding the investment situation produced by the war: "Many phases of the existing situation point to the conclusion that the present period of low prices for high-grade bonds will not be of long duration. In the first place, it must be remembered that we have experienced a tremendous dislocation of the credit machinery of the United States. Payment of existing loans has not to any appreciable extent been insisted upon by the banks, but new borrowing, except in cases of absolute necessity, has to the furthest possible degree been discouraged. The inevitable result of the great shock which has affected the credit structure will be a material contraction in commercial and industrial activity. Business will go slow until it catches its breath. It will require time to recover from the abnormal situation now existing. This slowing down will result in a great diminution of the demand for credit. There are already indications that the money markets of the country are beginning to experience easier tendencies. There are other influences which will operate to reduce the demands on the money markets. We refer to economies which undoubtedly will be put into effect by practically all corporations, both public and private. This eventually is of particular interest to the investor, because, inasmuch as almost all large expenditures by both public and private corporations are financed by bond issues, a general reduction in such expenditures will mean that the supply of new securities to be issued during the next six months or a year will be much below normal. If we at this time were to open our exchanges and at the same time were to establish a free market for gold, we have no doubt there would be an attempt on the part of Europe, so extremely exigent are the financial needs of the warring nations, to convert into gold through our markets, a very great volume of securities. Prices would be accepted which would have little regard for intrinsic values. That we cannot open our markets to Europe at this time is obvious. We can hardly spare sufficient gold to cancel our present indebtedness to France and England. It is true that in settling our foreign indebtedness we export commodities as well as gold, but we cannot conceive of a sufficient increase in our agricultural and other exports to offset our present indebtedness abroad and take care of the additional amount we should owe were we voluntarily to accept all the securities Europe should care to sell back to us. Our first duty is to ourselves. We can hardly be expected to open our markets to Europe if, as a result, the prices of our securities are to be slaughtered without regard to value or if our gold supply is to be seriously depleted. Nor can we keep our markets closed indefinitely. The problem is one of the greatest difficulty, but no doubt a way will be found to meet the situation."

GROWTH MAINTAINED IN THE WEST

Comparative Figures for August from Utilities in the Pacific and Mountain States Do Not Indicate Serious Loss Owing to War—Small Companies Pick Up

The accompanying tables tell a story of slackening growth and, reflecting as they do activities during the first month of the war, will at a first glance be considered as another proof of the depression due to the European conflict. However, although the depression caused by the war has had its influence, when a careful analysis is made of the underlying industrial, domestic and political conditions in the West the war depression begins to fall into the background.

TABLE I—COMPARATIVE RETURNS FOR JUNE, JULY AND AUGUST FROM COMPANIES IN SIX LARGE CITIES IN CALIFORNIA, WASHINGTON, OREGON, UTAH AND COLORADO, REPRESENTING OVER 60 PER CENT OF ELECTRIC-UTILITY INDUSTRY OF PACIFIC AND MOUNTAIN STATES

	Income Derived from Sale of Energy			Energy Output in Kw-hr.		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
June	$1,639,297	$1,559,596	5.1	140,494,562	129,504,858	8.5
July	1,645,688	1,531,493	9.6	144,776,151	131,387,904	10.4
August	1,642,096	1,595,891	3.0	145,646,901	140,920,218	3.4

Owing to lack of raw materials and an unfavorable labor market the industries of the Far West are few and by no means sufficient to supply the needs of that section. The peoples of the Rockies and Pacific for the most part still depend on the East for their manufactured products. Washington and Oregon do a large fishery and lumber business. California raises fruit. Montana, Nevada, Utah and other Mountain States have their gold, silver and copper mining and their fruit and cattle ranches. However, the great manufacturing industries which are characteristic of the East, employ thousands of people and are chief economic factors are lacking. Hence the war could have little if any effect on this class of industrial motor load.

TABLE II—COMPARATIVE RETURNS FOR MAY, JUNE, JULY AND AUGUST FROM COMPANIES IN SIX SMALL CITIES IN NEW MEXICO, ARIZONA, WASHINGTON, WYOMING AND IDAHO, REPRESENTING LESS THAN 1 PER CENT OF THE INDUSTRY OF THE PACIFIC AND MOUNTAIN STATES

	Income Derived from Sale of Energy			Energy Output in Kw-hr.		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
May	$55,828	$54,103	3.3	1,613,341	1,770,549	*8.8
June	54,753	55,596	*1.5	1,262,268	1,645,528	*23.3
July	58,250	56,305	3.5	1,488,635	1,756,973	*15.2
August	59,361	54,718	8.3	1,649,420	1,747,405	*5.5

* Decrease

Copper production was curtailed in August owing to the failure of the export market. But, as was noticed in a recent report by the Montana Power Company, which operates in the great copper districts of Butte, Helena, Anaconda, Great Falls, etc., other factors had stepped in to overcome the mining depression. In fact, a glance at Table II will show that six small companies in the copper-mining region did better in August than at any other time in the previous three months. Slackening growth in other sections can be accounted for in many ways. Probably the most significant of these was the condition of the irrigation load. The present year has been a poor year for irrigation

in comparison with last year. The long and severe droughts of 1913 caused the irrigation load to rise enormously.

In all of the Pacific Coast States, in addition, the question of state-wide prohibition came up at this election, and to the owners of the vast tracts of vineyards and hop-yards impending prohibition suggested curtailment of expendi-

TABLE III—COMPARATIVE RETURNS FOR JUNE, JULY AND AUGUST FROM OVER 60 PER CENT OF THE CENTRAL-STATION INDUSTRY OF THE PACIFIC STATES OF CALIFORNIA, WASHINGTON AND OREGON

	Income Derived from Sale of Energy			Energy Output in Kw-hr.		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
June	$1,329,041	$1,251,956	6.2	110,466,824	102,761,425	7.6
July	1,323,118	1,245,135	6.2	114,993,629	106,422,888	8.0
August	1,331,820	1,290,076	3.2	119,418,013	114,083,423	4.8

tures for expansion. Acreage was not increased, and irrigation, while necessary in many cases, did not increase to the extent that it might have done had the minds of the grape and hop growers been at ease and had not bountiful rains fallen last winter.

There is still another reason for a smaller growth being

TABLE IV—COMPARATIVE RETURNS FOR JUNE, JULY AND AUGUST FROM OVER 80 PER CENT OF THE CENTRAL-STATION INDUSTRY OF THE MOUNTAIN STATES OF COLORADO, NEW MEXICO, UTAH, ARIZONA, WYOMING, NEVADA AND IDAHO

	Income Derived from Sale of Energy			Energy Output in Kw-hr.		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
June	$565,846	$539,962	4.8	44,859,631	39,074,902	14.8
July	586,453	528,292	11.0	44,686,495	37,832,222	18.0
August	604,612	582,021	3.8	47,038,849	44,714,822	5.2

registered. Real-estate booms have not only collapsed but a reaction has set in. This has been felt particularly in the Northwest during the past year and has been attended with an exodus of people.

With the exception of the six small companies for which the figures are shown in Table II,, the entire Far Western

TABLE V—RETURNS RECEIVED BY THE ELECTRICAL WORLD FOR MAY JUNE, JULY AND AUGUST FROM THE CENTRAL-STATION INDUSTRY OF THE PACIFIC AND MOUNTAIN STATES

	Income Derived from Sale of Energy			Energy Output in Kw-hr.		
	1914	1913	Per Cent Increase	1914	1913	Per Cent Increase
May (60 per cent of industry)	$1,525,729	$1,426,885	7.0	144,839,552	129,357,915	11.9
June (70 per cent of industry)	1,894,887	1,791,918	5.8	155,326,455	141,836,377	9.6
July (75 per cent of industry)	2,212,827	2,068,249	6.8	183,160,015	169,718,387	7.9
August (78 per cent of industry)	2,386,677	2,282,061	4.6	193,216,699	185,330,705	4.2

section of the United States has gone ahead at about the same rate. This rate, while not up to the percentage of growth for July compares very favorably, under the circumstances, with the figures for some of the previous months, June especially.

Business Notes

D. J. Martins, dealer in materials for electrical installations at Sao Paulo, Brazil, is finding difficulty in obtaining goods from European countries and is desirous of getting catalogs and other information from electrical concerns in the United States.

The Electric Service Supplies Company, Philadelphia, has recently taken the agency for selling the "never-creep" anchors made by the Chance Manufacturing Company, Centralia, Mo. This anchor was described in the *Electrical World* of June 20, 1914.

The Sprague Electric Works of the General Electric Company.—F. W. Hall, formerly manager of apparatus sales for the Sprague Electric Works, New York, has been appointed sales manager. Mr. Hall has been associated with the Sprague Electric Works for nineteen years.

The Day Electric Vehicle Syndicate, 45 Broadway, New York, has recently been formed and purposes to place on the market a new electric automobile at a moderate price. The development of this car, it is expected, will be completed the first of the year. Max E. Schmidt is chairman of the syndicate, H. W. Hillman is treasurer, H. E. Day is resident engineer, and Dr. C. P. Steinmetz is consulting engineer.

New Industrial Companies

The Colonial Electric & Manufacturing Company, of Boston, Mass., has been incorporated with a capital stock of $35,000 by E. G. Carter, of Somerville, Mass., and J. F. Russell, of Cambridge, Mass.

The Metropolitan Electrical Products Company, of Brooklyn, N. Y., has been chartered with a capital stock of $10,000 to do a general contracting and engineering business, and to deal in electrical supplies, etc. The incorporators are E. A. S. Timothy, D. C. Choate and T. J. Crafton, 197 Powers Street, Brooklyn, N. Y.

Trade Publications

Metal Cut-out Boxes.—Prices of metal cut-out boxes are given in a folder which is being distributed by the Union Electric Company, Pittsburgh, Pa.

Flame-Arc Lamps.—"Type W Flame-Arc Lamps for Series and Multiple Circuits" is the subject of Bulletin No. 43,320 of the General Electric Company.

Composition Receptacles.—A flush plug-type receptacle made of composition is described and illustrated in a leaflet sent out by the Chelton Electric Company, Philadelphia.

Steam Engines.—Catalog No. 17 recently issued by the Reeves-Cubberley Engine Company, Trenton, N. J., describes and illustrates several types of steam engines.

Porcelain Insulators.—A catalog describing various insulating articles made by the wet and dry process has been issued by the firm of J. H. Parker & Son, Chelsea, Mass.

Washing Machines.—The Meadows Manufacturing Company, Pontiac, Mich., has recently issued a bulletin describing and illustrating its "safety power" electric washer.

Rotary Converters.—Synchronous booster rotary converters are the subject of Leaflet No. 3749, sent out by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Reflectors.—V-shaped fluted reflectors and indirect fixture bowls are illustrated in a folder which is being distributed by the Friedley-Voshardt Company, 733 South Halsted Street, Chicago.

Electric Trucks.—In an attractively illustrated thirty-two-page catalog issued by the General Vehicle Company, Long Island City, New York, various types of electric vehicles for commercial uses are described.

Electrical Devices.—Catalog No. 7, entitled "Electrical Specialties," describes and illustrates switches, receptacles, etc., manufactured by the Machen & Mayer Electrical Manufacturing Company, Philadelphia, Pa.

Personal Mention

Mr. Frederick Sargent, of Sargent & Lundy, of Chicago, sailed from New York on Nov. 4 for England.

Mr. D. C. Wilson has succeeded Mr. A. J. Collett as electrical engineer for the Union Pacific Railroad, with headquarters at Omaha, Neb.

Prof. R. M. Parks, formerly of the faculty of the Manual Training High School, has been appointed city gas and electrical inspector of Louisville, Ky.

Mr. J. P. H. de Windt, vice-president and general manager of the Birmingham (Ala.) Railway, Light & Power Company, has been elected president of the Alabama Light & Traction Association.

Mr. A. J. Collett, who was formerly electrical engineer for the Union Pacific Railroad, with headquarters at Omaha, Neb., has removed to Santo Domingo, in the West Indies, where he is supervisor of public improvements at Santo Domingo City.

Mr. J. M. Moncrieff has been appointed manager of the La Crosse (Wis.) Gas & Electric Company, succeeding Mr. A. W. Higgins, who has been transferred to Indianapolis. Mr. Moncrieff was formerly manager of the electric-lighting plant at Bloomington, Ind.

Mr. Arthur Atwater Kent, of Rosemont, Pa., has, on the recommendation of the Franklin Institute, been awarded by the city of Philadelphia the John Scott legacy medal and premium for his "unisparker." The "unisparker" is an essential element of the Atwater Kent ignition system for automobiles and consists of a contact-breaker, governor and distributer arranged in one structure.

Mr. A. W. Higgins, formerly manager of the La Crosse Gas & Electric Company, La Crosse, Wis., has been appointed general manager of the Merchants' Heat & Light Company, of Indianapolis, Ind., a subsidiary of the American Public Utilities Company. Mr. Hugh H. Harrison, of Indianapolis, continues as president of the Merchants' company, which operates the largest central-heating plant in the world.

Mr. W. H. McGrath, who has been assistant to Mr. A. W. Leonard, vice-president and general manager of the Puget Sound Traction, Light & Power Company, Seattle, Wash., has been appointed manager of the company. Mr. McGrath was born in Massachusetts and has been identified with Stone and Webster since 1901. He entered the employ of the firm at the home office in Boston following his graduation from Harvard University.

Mr. Charles R. Underhill, chief engineer of the Acme Wire Company, New Haven, Conn., lectured before the A. I. E. E. branch of Purdue University on Oct. 27 and before the A. I. E. E. branch of the Ohio State University on Oct. 30. This year Mr. Underhill is exhibiting the results of numerous tests with the oscillograph in connection with both alternating-current and direct-current electromagnets having various lengths of air-gaps and with the plunger or armature in motion.

Mr. A. J. Farrelly, electrical engineer of the Chicago & Northwestern Railway, Chicago, and organizer and first president of the present Association of Railway Electrical Engineers, has been confined to his room by illness following a sprain received at his country place in Michigan. Mr. Farrelly was unable to attend the convention of the railway electrical engineers held at Chicago during the week of Oct. 26, but the association sent to his bedside a handsome floral tribute accompanied by a note of regret at his absence from its sessions.

Mr. W. W. Freeman, in addition to his election as president of the Union Gas & Electric Company and of the South Covington & Cincinnati Street Railway Company, as published last week, has been elected president of the following companies operating in the States of West Virginia, Ohio and Kentucky: The Union Light, Heat & Power Company (Kentucky), the Suburban Electric Company, the Kentucky Electric Company, the Municipal Light Company, the Covington Electric Company, the Cincinnati, Newport & Covington Railway Company, the Cincinnati, West Covington & Ludlow Street Railway Company, the Newport Electric Street Railway Company, the Cincinnati, Covington & Rosedale Railway Company, the Covington & Latonia Railroad Company, the Cincinnati, Covington & Erlanger Railway Company and the Licking River Bridge Company. The above companies are controlled by the Columbia Gas & Electric Company.

Mr. Frederick S. Pratt, of Stone & Webster, has been elected chairman of the board of directors of the Puget Sound Traction, Light & Power Company, Seattle, Wash. Mr. Pratt is forty-two years of age. He was graduated from Harvard and has been identified with the Stone & Webster interests for nearly twenty years. His first position was in the engineering department in the Boston offices. Soon after the Seattle fire in 1889, when the late Jacob Furth began the work of reorganizing and reconstructing the various electric railways in Seattle under one management, Mr. Pratt took the active management of the properties for a year, subsequently returning to Boston. During his identification with Stone & Webster Mr. Pratt's work has been largely with the company's interests on Puget Sound, although his headquarters have been in the East. He will remain in Boston. Mr. Pratt was formerly vice-president of the Puget Sound Traction, Light & Power Company.

Mr. Elmer Ambrose Sperry, of New York City, has been awarded the John Scott legacy medal and premium by the city of Philadelphia, acting on the recommendation of the Franklin Institute, for his gyro-compass. Mr. Sperry was also recently awarded the first prize of 50,000 francs in the aerial security contest held at Bezons, France, this summer, following the successful test of his aeroplane-stabilizing device. For some years Mr. Sperry has devoted practically his whole time to overcoming the numerous physical difficulties involved in the adaptation of a gyroscope to a ship's compass in the place of a magnetic needle. He has been able to make an instrument which automatically corrects for the speed and direction of the vessel and which is unaffected by the rolling of the ship in a heavy sea, is entirely non-magnetic and is unaffected by the proximity of iron. Mr. Sperry was born Oct. 12, 1860, at Cortland, N. Y., and received his technical training at Cornell University. He is at present president and engineer of the Sperry Gyroscope Company of Brooklyn, N. Y.

Mr. A. W. Leonard, for the last two years vice-president and general manager of the Puget Sound Traction, Light & Power Company, with headquarters in Seattle, Wash., has been elected president of the company and member of the board of directors to succeed Jacob Furth, deceased. Mr. Leonard was born in Monmouth, Maine, forty-one years ago. Nineteen years ago he entered the employ of Stone & Webster as a bookkeeper and was promoted to be general manager and superintendent of the Edison Electric Illuminating Company of Brockton, Mass., twelve years ago. He was transferred to Houghton, Mich., as superintendent of the Houghton County Electric Light Company, and was subsequently manager of that property and the Houghton County Traction Company for four years. He then went to Minneapolis as manager of the Minneapolis General Electric Company. In this position he had practical supervision over all the Stone & Webster properties and plants in the Middle West. On Oct. 12, 1912, he was appointed vice-president and general manager of the various Puget Sound companies.

Obituary

Johannes de La Motte, manager of the American Telegraph Company during the régime of the late Jay Gould and General Eckert, and prominent in the Western Union Telegraph Company, died at his home in Brooklyn, N. Y., Oct. 27, in his seventy-sixth year. Mr. de La Motte came to this country from Germany, where he was a government official in the railway and telegraph service, in 1869. He became general manager of the now defunct Atlantic & Pacific Telegraph Company, and when Gould and Eckert began to war on the Western Union Company he joined them and became manager of the competing company. He retired in 1902.

Construction

New England

KENNEBUNK, MAINE. — During the past few months the Electric Light Department has erected about 5¾ miles of transmission line leading into a farming locality to furnish a commercial service. The commercial circuit in the town proper has been changed from single-phase to three-phase. I. H. Wells is superintendent.

BOSTON, MASS.—The Edison El. Illg. Co. of Boston has closed a contract with the New York, New Haven & Hartford R. R. Co. to furnish energy to the railroad company in the Greater Boston district. Under the new arrangement the Edison company will supply electricity at the Back Bay railroad station, the South Boston terminal buildings and the Dorchester railroad shops. The railroad company will dismantle its power plants which formerly furnished electricity to these buildings.

LOWELL, MASS.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Nov. 30, for the installation of a new hoistway, electric freight elevator, etc., in the United States post office at Lowell, Mass. For details see proposal columns. O. Wenderoth is supervising architect.

MALDEN, MASS.—Within the next six months the Malden El. Co. expects to purchase 12 ornamental lamp-posts; also 30 toasters and 30 percolators. J. T. Day is manager.

Middle Atlantic

BATH, N. Y.—Bids will be received by Joseph A. Goulden, president board of trustees New York State Soldiers and Sailors' Home, Bath, until Nov. 17 for electric elevators for the convalescent barracks at the home. Drawings and specifications may be consulted at the New York State Soldiers and Sailors' Home, Bath; at the New York office of the Department of Architecture, 1224 Woolworth Building, and at the Department of Architecture, Capitol, Albany. Lewis F. Pilcher is state architect.

BRASHER FALLS, N. Y.—The Public Service Commission has granted the Milling & Ltg. Co. permission to construct and operate an electric plant and exercise franchises in the towns of Brasher and Stockholm in St. Lawrence County.

BROOKLYN, N. Y.—The Public Service Commission has directed the Long Island R. R. Co. to install a lighting system in the Atlantic Avenue tunnels in Brooklyn for use in emergencies.

BROOKLYN, N. Y.—Bids will be received at the office of the Mayor, City Hall, New York, until Nov. 16 for new lighting system, etc., for the Twenty-third Regiment Armory, 1322 Bedford Avenue, Brooklyn, and for alterations and additions to the electric-light equipment, Second Battalion, Naval Militia, Armory, foot of Fifty-second Street, Brooklyn. Blank forms and further information may be obtained at the office of the armory board, Hall of Records, New York.

BROOKLYN, N. Y.—Bids will be received by C. B. J. Snyder, superintendent of school buildings, Department of Education, Park Avenue and Fifty-ninth Street, New York, until Nov. 9 for installing electric equipment in new Public School 178, on Dean Street, near Saratoga Avenue, Brooklyn, N. Y. Blank forms, plans and specifications may be obtained at the office of the superintendent, Park Avenue and Fifty-ninth Street, New York, and also at branch office, 131 Livingston Street, Brooklyn.

BUFFALO, N. Y.—Bids will be received by Dr. Thomas E. Rinegan, assistant commissioner for elementary education, Educational Building, Albany, until Nov. 9 for electric fixtures at the Buffalo State Normal School, Buffalo, N. Y. Drawings and specifications may be seen at the Buffalo State Normal School, Buffalo; at the New York office of the Department of Architecture, 1224 Woolworth Building, and at the Department of Architecture, Capitol, Albany. Lewis F. Pilcher is state architect.

GLENS FALLS, N. Y.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Dec. 17 for construction, including mechanical equipment, lighting fixtures and approaches, of the United States post office in Glens Falls. Drawings and specifications may be obtained at the above office or from the custodian at Glens Falls. O. Wenderoth is supervising architect.

HUDSON, N. Y.—The Albany Southern R. R. Co., of Hudson, has applied to the Public Service Commission for permission to erect transmission lines to supply electricity in the town of Nassau.

ONEIDA, N. Y.—The installation of an ornamental street-lighting system in the business section of the city is under consideration.

SCHENEVUS, N. Y.—Arrangements are being made by the Great Bear Lt. & Pwr. Co., of East Worcester, to take over the local plant. This plant will be abandoned and electricity will be supplied from the power station in East Worcester. The pole line between the two towns has been completed. When connection is made a 24-hour service will be established here. W. F. Shupe is manager.

WATERVLIET, N. Y.—The Cohoes Co., Cohoes, has applied to the Board of Aldermen for a franchise to erect transmission lines to supply electricity in Watervliet.

WESTMORELAND, N. Y.—The Public Service Commission has granted Arthur Hind permission to erect a distribution system to supply electricity in Westmoreland in accordance with a franchise granted by the town. Mr. Hind at present furnishes electricity from the plant of the Plush company to the employees of that company, and the franchise permits him to extend the service throughout the town.

FRANKFORD, PA.—Steps have been taken by the Frankford Board of Trade for the installation of ornamental lamps in the business district. One hundred members will erect tungsten lamps suspended on ornamental arms between the curb and the building line.

HASTINGS, PA.—The proposal to issue $32,000 in bonds for the installation of a municipal electric-lighting plant will soon be submitted to the voters.

PHILADELPHIA, PA.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Dec. 2, for coal-handling apparatus, etc., in the United States Mint, Philadelphia, in accordance with plans and specifications, copies of which may be obtained at the above office or at the office of the custodian of the Mint. O. Wenderoth is supervising architect.

SHAMOKIN, PA.—The contract for the construction of power house at the State Hospital in Shamokin has been awarded to the East End Lumber Co. of Shamokin. The building will be 28 ft. by 100 ft. and will cost about $10,000.

BURLINGTON, N. J.—The City Council has decided to change the motive power of the pumping station from steam to electricity, at a cost of about $6,000. Four pumps operated by electric motors will be installed. Energy for operating the station will be obtained from the plant of the Pub. Ser. El. Co.

JERSEY CITY, N. J.—The City Center Merchants' Association is negotiating with the Board of City Commissioners for the installation of a new street-lighting system, using high-candle-power lamps, on Central Avenue, similar to the system to be installed on Newark Avenue by the Public Ser. El. Co.

KEARNY, N. J.—The Town Council is considering improving the street-lighting system and a redistribution of the electric lamps throughout the town. The Pub. Ser. El. Co. has the contract for street-lighting.

NEWARK, N. J.—The Board of Public Works has adopted an ordinance granting the Public Ser. El. Co. permission to replace its poles on Springfield Avenue with combination arc-lamp and trolley standards.

SAYREVILLE, N. J.—The township committee has awarded two contracts for street-lighting—one to the Sayreville Ltg. & Pwr. Co. for a period of five years, which calls for the installation of 130 incandescent lamps and 15 arc lamps; the other to the Middlesex & Monmouth El. Ltg. & Htg. Co., of Keyport, for lighting the Morgan Heights section of the town. The contract is for a period of five years and calls for 18 lamps.

TRENTON, N. J.—The United & Globe Rubber Mfg. Co. is planning to build a new electric-power plant to provide for a 24-hour service at its factory. The J. Hall Smith Co., an adjoining manufacturing plant, will also be interested in the new station, which is being designed by the Wright El. Co., of Trenton. The plant will supply energy for both properties.

CENTERVILLE, MD.—Within the next six months the Water and Light Commission expects to purchase 2½ miles of No. 8 weatherproof wire, three 15-kw transformers, one 35-hp and one 15-hp slip-ring variable-speed motor. L. D. Shank is manager.

ALEXANDRIA, VA.—The new power house of the Alexander County Ltg. Co. has been completed, and during the coming winter new turbines and boilers to double the present output of the plant will be installed. The new building was erected around the old power house, which was torn down when the new structure was completed.

WASHINGTON, D. C.—The Adams Express Co., it is reported, is contemplating the installation of an electric power plant at Second and I Streets in Washington, to cost about $15,000.

WASHINGTON, D. C.—A firm in the United Kingdom advises an American consular officer that he desires to secure an agency for an American made electrical vacuum cleaner. For further information address No. 14,215, Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., or branch office, Room 409, United States Custom House, New York, N. Y.

WASHINGTON, D. C.—An American consular officer in Great Britain has transmitted a list of materials which a firm of electrical manufacturers in his district has been purchasing in Europe. The consular officer suggests that American manufacturers of similar goods submit samples, prices and terms. A copy of the list may be had on application to No. 14,181, Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., and its branches.

WASHINGTON, D. C.—An American consular officer in the United Kingdom transmits a letter from a company in his district which is desirous of getting into touch with manufacturers of wire of every description, including brass, copper, phosphor bronze, lead composition, steel, etc. A list of the principal kinds of wire the company is interested in has been forwarded, and a copy of this list may be had on application to the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., and its branches, referring to No. 14,178.

WASHINGTON, D. C.—Bids will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until Nov. 24, for furnishing at the various navy yards and naval stations the following supplies: Brooklyn, N. Y., Schedule 7515—50,000 ft. 4107-circ. mil stranded portable ship-lighting cable, 38,000 ft. 2580-circ. mil incandescent-lamp cord (in 500-ft. coils), 20 16-in., 60-cycle, 110-volt, single-phase induction, alternating-current fans, 3700 lb. triple-braided weather-proof wire; Schedule 7517—300 receiver cords for double-head radio headgears, 36 headgears for radio receiving sets, United States Navy standard, 18¼-hp, 125-volt portable ventilating sets and spare armatures and field cords, 3900 ft. armored, portable double-conductor wire, miscellaneous double-cotton-covered and single-silk-covered magnet wire, 1300 ft. rubber-insulated rat-tail wire for aerials, 34,000 ft. 4000-circ. mil galvanized soft-steel leaded and armored twin-conductor wire, 55,000 ft. 4000 and 30,000-circ. mil plain twin-conductor wire. Charleston, S. C., Schedule 7517—400 D. P. interior switch and receptacle fittings complete with handles; Schedule 7511—3150 lb. hexagon bronze, commercial lengths; Schedule 7516—20,000 lb. manganese pig bronze; Schedule 7513—6000 lb. ¼-in. by 1/12-in. carbide calcium. Philadelphia, Pa., Schedule 7516—500 lb. ½-in. hard, round copper, commercial lengths. Bids will also be received at the same place until Dec. 1, as follows: Mare Island, Cal., Schedule 7520—1500 lb. copper pipe (12-ft. lengths), 4000 lb. admiralty metal tubing, ½ in. inside diameter, ⅞ in. outside diameter, for condenser ferrules; Schedule 7518—1500 ft. 2-in. black wrought pipe. Puget Sound, Wash., Schedule 7520—miscellaneous seamless copper tubing, 12-ft. lengths. Bids will also be received until Dec. 8 as follows: East and West, Schedule 7522—miscellaneous dry cells. Applications for proposals should designate the schedule desired by number.

North Central

BEAR LAKE, MICH.—The Benzie County Pwr. Co., of Frankfort, has been granted a franchise to furnish electricity in Bear Lake. A substation will be erected here and a transmission line from the company's plant to Bear Lake, a distance of 14 miles, work on which has already been started. Most of the material for this extension has been purchased. E. L. Johnson is secretary.

EATON RAPIDS, MICH.—The village of Eaton Rapids is contemplating increasing the output of the municipal electric-light plant during the coming spring and summer by the installation of a 120-kva generator and engine. I. R. Ellison is superintendent.

ELK RAPIDS, MICH.—The Elk El. Co., of Elk Rapids, has erected within the last three months a transmission line to Wil-

liamsburg, a distance of 10 miles. C. D. Towne is secretary and treasurer.

ESCANABA, MICH.—Within the next six months the Board of Public Works expects to purchase electrical appliances and supplies, including heating and cooking apparatus, vacuum cleaners, washing machines, etc., amounting to approximately $1,000. John Roemer is superintendent.

GLADSTONE, MICH.—Within the next three months the Electric Light Commission expects to purchase material, including 30-ft. poles, wire, etc., for a 6600-voit, three-phase transmission line to Rapid River (6 miles long); also material for local distribution system in Rapid River. G. W. Frogner is superintendent.

HOWELL, MICH.—A 20-ft. extension has recently been erected at the power house of the municipal electric light and power plant, and a 250-kva alternating-current (engine-type) generator and one 20-in. by 20-in. side crank Corliss valve engine are now being installed. The commissioners expect within the next few months to purchase a carload of poles.

MONROE, MICH.—Arrangements are being made by the Commissioner of Public Utilities to change the municipal electric-light plant from single-phase, 1100 volts, to three-phase, 2300 volts. Contracts have already been placed for the necessary equipment, which includes a complete switchboard and new coils for the Western electric generator; also three General Electric street-lamp regulators, with complete switchboards for the three circuits maintained; also new transformers and meters. Two 150-hp return-tubular boilers are now being installed. The entire city will be rewired for use of the new system in a short time. The old arc-lamp street-lighting system has been replaced with the new nitrogen lamps.

NORTHVILLE, MICH.—The town of Northville expects to purchase within the next two months a new switchboard, about 5 miles of wire and a car load of poles for the municipal electric-lighting system. Samuel Wilkinson is superintendent.

ONAWAY, MICH.—The Onoway El. Lt. & Pwr. Co. expects to purchase within the next 12 months a few small lighting and power transformers, primary and secondary wire, meters, etc.; also within the next six months 50 flatirons, 50 toasters and possibly some washing machines. J. Isbistis is manager.

CONNEAUT, OHIO.—Plans are being considered for rebuilding the municipal electric-light plant, to cost about $35,000. The matter, it is understood, will be held in abeyance until spring. S. W. Mehaffey is director of public service.

GALION, OHIO.—The City Council has authorized the city director of service to purchase material for the installation of a cluster-lamp lighting system in the business district of the city.

HILLSBORO, OHIO.—The Hillsboro Lt. & Fuel Co. is preparing for submission to the voters a contract providing for the installation of 16 264-watt nitrogen-filled lamps and 140 70-watt nitrogen-filled lamps, at a cost of $5,160 per year.

MOUNT VERNON, OHIO.—Work has begun on the erection of the transmission line from Mount Vernon to Fredericktown by the Ohio Lt. & Pwr. Co. This is part of the line that will eventually extend from Wheeling, W. Va., to Tiffin, Ohio.

PEMBERVILLE, OHIO.—The village of Pemberville has purchased the local electric distribution plant and system (220 volts, direct current). This system will be rebuilt and changed to 2300 volts, single-phase, 25 cycles. Energy will be purchased from the Toledo, Fostoria & Findlay Ry. Co. at 2300 volts. Material for distribution line has been purchased. Eight transformers, total capacity 75 kw, 2300/110/220 volts, and about 125 5-amp, 10-amp and 20-amp meters (110 volts, 25 cycles, single-phase) will be purchased; also material for street-lighting system, consisting of about 65 series, type C tungsten street-lamps and regulator. Fred H. Froehlich, Second National Bank Building, Toledo, is engineer.

ST. HENRY, OHIO.—The Council has passed an ordinance authorizing an issue of bonds for the installation of a municipal electric-light plant, to be operated in connection with the water-works system. Contract for the construction of the proposed plant, it is understood, will be awarded Nov. 20.

SANDUSKY, OHIO.—Bids will be received by John J. Molter, director of public service, until Nov. 30 for furnishing and operating a complete electric-lighting system for lighting streets, lanes, parks and public places of the city.

WEST LAFAYETTE, OHIO.—The Lafayette Lt. & Pwr. Co., of Coshocton, has been granted a franchise to supply electricity for lighting, commercial and manufacturing purposes in the village of West Lafayette for a period of 25 years.

CADIZ, KY.—Arrangements are being made by A. P. and Stanley White for the installation of an electric-lighting system in Cadiz, material for which, it is understood, has already been purchased. Power for operating the system will be obtained from the dam on Little River. An 80-hp oil engine will drive the plant during the low-water periods.

FRANKLIN, KY.—The Franklin El. Lt. & Ice Co., it is reported, is contemplating the erection of a transmission line to Portland, a distance of 12 miles.

IRVINE, KY.—The electric-light franchise recently offered for sale by the town was purchased by C. R. Flynn, of Irvine. It is understood that an electric plant will be installed in the near future.

LOUISVILLE, KY.—The new factory which the J. F. Kurfees Paint Co. proposes to build in Louisville next spring, it is reported, will be equipped with electrically driven machinery.

LOUISVILLE, KY.—Plans are being considered by the Louisville Chemical Co., 1455 South Seventh Street, Louisville, to equip its proposed new plant with electrically operated machinery.

STITHTON, KY.—Plans are being considered for the installation of an electric-lighting plant in Stithton, to cost about $2,500. George Greenup and L. J. Metcalfe are reported interested in the project.

VINE GROVE, KY.—Within the next two months the Citizens' Ltg. Co., of Vine Grove, expects to purchase an engine. Miss Pearl Starder is secretary and treasurer.

FERDINAND, IND.—The Water Works Co., recently organized, is constructing a water-works system and later will take over the local electric-light plant. The company is now building a dam for water-works and will ask for bids on the following: (1) one 60-hp boiler and stack, one 7-in. by 10-in. duplex pump (125-lb. pressure), to elevate water to tank on a 50-ft. steel tower, tank to have a capacity of 75,000 gal., and the pump to pump water from main pipe in case of fire; (2) one 60-hp oil engine, pump same as above, to be connected by clutch and air-compressor starting device; (3) alternating-current motor connected to triplex pump. The company would like to receive estimates on the three systems. Address bids and catalogs to William R. Sauer, vice-president, Ferdinand. E. Pickhardt is constructing engineer.

HUNTINGBURG, IND.—At an election held recently the proposal to take over the electric-light plant of the Huntingburg El. Lt. Co. was carried. The State Public Service Commission will be asked to make an appraisal of the property. It is proposed to make improvements to the plant and equip the water-works pumping station for electrical operation.

HUNTINGTON, IND.—Bids will be received by the city of Huntington until Nov. 23 for furnishing and installing steam, exhaust and power plant piping in the municipal light and water plant. Charles Brossman, consulting engineer, 1616 Merchants' Bank Building, Indianapolis, has charge of the work.

PLYMOUTH, IND.—The County Commissioners have granted the Plymouth El. Lt. & Pwr. Co. permission to erect transmission lines through Liberty Township.

ATWOOD, ILL.—The Council has engaged Ralph Blackwell to take charge of the engineering work for the proposed electric-light plant for which bonds were recently authorized.

HARTSBURG, ILL.—The Orvil Lt., Pwr. & Wtr. Co., recently organized, is planning to install an electric-lighting system in Hartsburg. About 8 miles of wire will be required for the distributing system. About 50 meters will be used to begin with. D. A. Roberts, of Springfield, is engineer in charge. D. Van Gerpen is secretary of the company.

HAVANA, ILL.—The contract for installing the cluster lamps in the business section has been awarded to the Caldwell El. Co., of Champaign, at $3,075.

NOKOMIS, ILL.—A temporary injunction restraining the city of Nokomis from purchasing electrical equipment or from selling bonds for the municipal electric-light plant has been secured by the Central Illinois Pub. Ser. Co. in the Circuit Court at Litchfield. The company has a contract with the city of Nokomis to furnish electricity for lamps and motors, and claims that the bonds voted for the municipal electric-light plant on Oct. 15 are illegal.

OTTAWA, ILL.—Steps have been taken by the Rotary Club for the installation of an ornamental street-lighting system in the business district.

RANKIN, ILL.—A franchise has been granted by the Village Board to Mr. Crump to install and operate an electric-light plant in Rankin.

ROBINSON, ILL.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Dec. 4 for construction, including mechanical equipment, lighting fixtures and approaches, of the United States post office at Robinson. Drawings and specifications may be obtained at the above office or from the custodian of site at Robinson. O. Wenderoth is supervising architect.

GLIDDEN, WIS.—The property of the Glidden Mfg. Co., together with electric-light plant, was recently destroyed by fire.

MERRILL, WIS.—Preparations are being made for the installation of an ornamental street-lighting system in Merrill.

ORFORDVILLE, WIS.—The Orfordville Lt. & Pwr. Co., recently organized to supply electricity in Orfordville, is making preparations to install an electric-light plant. The equipment will include one 30-kva, three-phase, 60-cycle, 2400-volt Westinghouse generator, one 40-hp St. Mary's gas engine, switchboard equipment and seven Westinghouse transformers from ½ kw to 15 kw; 163 poles, about 4 miles of wire, and 60 Sangamo meters. Series 6.6-amp street lamps will be used. No contracts will be let, as the company will do its own work. A. E. Tomlin will have charge of the engineering work.

SPARTA, WIS.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Nov. 30 for construction complete, including mechanical equipment, lighting fixtures and approaches, of the United States post office at Sparta. Drawings and specifications may be obtained at the above office or from the custodian of site at Sparta. O. Wenderoth is supervising architect.

BEMIDJI, MINN.—Plans are being considered by the Warfield El. Co., of Bemidji, to extend its transmission lines to Lavinia, at the head of the lake, next spring.

HUTCHINSON, MINN.—The Hutchinson Ltg. & Mfg. Co. expects to install within the next three weeks a 225-hp Busch-Sulzer Bros. Diesel oil engine and a 200-kva, 2300-volt generator.

LITTLE FALLS, MINN.—The Little Falls Wtr. & Pwr. Co. has recently completed a concrete dam to replace an old wooden structure and expects to build an extension to its power house next year. T. C. Gordon is secretary and general manager.

MONTEVIDEO, MINN.—The Montevideo El. Lt. & Pwr. Co. has nearly completed the erection of 12 miles of 23,000-volt transmission line and is installing a condenser equipment for a 625-kva steam turbine. The company is also installing a distribution system at Clara City, with substation, which will soon be put into operation. E. A. Aspnes is engineer and general manager.

REDWOOD FALLS, MINN.—Within the next ten days the Wherland El. Co., of Redwood Falls, expects to purchase five 5-kw, 2200/220/110-volt transformers and a series street-lighting system, consisting of 15 60-watt and five 300-watt lamps. R. F. Wherland is secretary and manager.

ROCHESTER, MINN.—The City Council has authorized the utility board to secure a new site for the municipal electric-light plant and to prepare preliminary plans for a new plant to cost from $100,000 to $125,000. It is proposed to move the plant from its present location, whcih is in the heart of the city.

STILLWATER, MINN.—The Consumers' Pwr. Co., of Stillwater, has closed a contract with the village of St. Elmo to furnish electricity for lamps and motors. A short extension of the transmission line will be erected from South Stillwater, to make the connection.

WALNUT GROVE, MINN.—Preparations are being made by Messrs. Nordgren & Dahgren for the installation of an electric-light plant in Walnut Grove. The plant will be driven by a gas engine. Contracts for equipment, it is understood, have been placed.

ELDORA, IA.—Within the next eight months the Iowa River Lt. & Pwr. Co., of Eldora, expects to erect 12 miles of transmission line. J. C. Lundy is manager.

LAKE CITY, IA.—The Central Lt. & Pwr. Co., of Boone, is reported to have purchased the local electric-light plant, owned by O. E. Brownell.

LARCHWOOD, IA.—The Council has engaged Earl D. Jackson, Capitol Bank Building, St. Paul, Minn., to take charge of the engineering work in connection with the proposed municipal electric-light plant, to cost about $10,000.

LEON, IA.—The Leon El. Co. is installing a 15-kw series street-lighting system. Contract has already been placed for a

Fort Wayne regulator for Leon. J. F. Smith is president.

MARENGO, IA.—The Iowa Ry. & Lt. Co. has been granted permission to reconstruct its electric-light plant and system in Marengo.

ROCK RAPIDS, IA.—Improvements and extensions have been made to the municipal street-lighting system, including the installation of 51 ornamental lamp standards, at a cost of $6,500. W. F. Gingrich is manager.

SANBORN, IA.—The Sanborn El. Co. expects to purchase within the next six months one 16-ft. by 60-in. horizontal tubular boiler (150 lb. pressure), one 45-kw, 6600/2300-volt step-down transformer and one 50-kw, 2300/6600-volt step-up transformer. The company has recently erected a 2300-volt transmission line from Sanborn to Primghar (7 miles long) and distributing lines in Primghar. George A. Healey is president and manager.

THOR, IA.—Plans are being considered for the organization of a company to install an electric-light plant in Thor. G. E. Nurby is reported interested in the project.

WILLIAMS, IA.—Within the next few months the F. R. Payne Co., owner of the local electric-light plant, expects to purchase an elevator for handling coal. F. R. Payne is manager.

BLUE SPRINGS, MO.—Work has begun on the installation of the machinery and equipment for the new electric-light plant in Blue Springs.

CASSVILLE, MO.—The Ingalls Stone Co., it is understood, contemplates the construction of a power house to develop from 250 up to 350 hp.

JOPLIN, MO.—The city of Joplin has made a contract with the Home Tel. Co. for the installation of a police-alarm system to be maintained by the company.

ST. LOUIS, MO.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Dec. 2 for a vacuum cleaning apparatus in the United States post office in St. Louis, Mo. For details see proposal columns.

WEBSTER GROVES, MO.—The El. Co. of Missouri, a subsidiary of the North American Co., has secured a contract to furnish electrical energy to the amount of 4000 hp to the Continental Portland Cement Co. at Continental. Electricity will be supplied from the Keokuk plant.

OSHKOSH, NEB.—The Council has granted James M. Weldon, of Woodriver, a franchise to install an electric-lighting system in Oshkosh.

TALMAGE, NEB.—At an election held recently bonds to the amount of $9,000 were voted for the installation of a municipal electric-light plant.

McPHERSON, KAN.—Within the next three months the city of McPherson expects to purchase a vacuum pump for exhaust-steam-heating system, 8-in. Venturi tube with complete recorders, pipe covering for entire steam lines, coal-handling system, and probably material for railroad spur; also within the next six months pole-line material, including wire, etc. (for new lines and for repairs to present system), lightning arresters, meters and portable standard meter tester. It is proposed to establish within the next two months a cooking rate and place a number of ranges through local contractors. Arthur Groesbeck is superintendent.

Southern States

DURHAM, N. C.—The Southern Pwr. Co. has purchased a tract of land between Durham and University Station on which it proposes to erect an auxiliary power plant. The new plant will have an output of 10,000 hp. and will cost about $500,000. Work, it is understood, will begin at once on the proposed plant.

ADEL, GA.—Within the next four months the town of Adel expects to erect 3000 ft. of transmission line for series street lamps and six series street lamps. T. R. Sutton is superintendent.

ALBANY, GA.—The Albany Pwr. & Mfg. Co. is installing a 1250-kw General Curtis turbine complete, with all auxiliaries, material for which has been purchased.

SAVANNAH, GA.—Bids will be received by the H. S. Jaudon Engineering Co., P. O. Box 582, Savannah, Ga., until Nov. 18 for construction of electric plant and waterworks system as follows: Pole-line electric distributing system, electric generating and pumping plant equipped with two 100-hp boilers, feed-water pump and heater, steam engines, alternating-current generator, switchboard and accessories as per plans and specifications.

DRESDEN, TENN.—At an election to be held Nov. 21 the proposal to issue $27,000 in bonds to construct an electric-lighting plant and water-works system will be submitted to the voters.

JACKSON, MISS.—Two sets of plans, it is reported, have been prepared by M. L. Culley, city engineer, for a municipal electric-light and power plant. The first provides for locating the plant in the city, to cost about $165,000; the other to locate a power house at the pumping station of the water-works system, at a cost of about $155,000. Both plans provide for placing wires in underground conduits in the business section, at an estimated cost of $29,000.

LESLIE, ARK.—The Leslie Ice, Ltg. & Pwr. Co. and the Lenker Hub Co. have consolidated under the name of the Leslie Ice, Ltg. & Pwr. Co. The new company is capitalized at $48,000. E. Mays is manager.

BUNKIE, LA.—Preparations are being made by the Bunkie Ice Co. to take over the franchise now owned by W. D. Haas. The company proposes to install an entire new plant and furnish a 24-hour service. W. L. Thompson, of Boyce, has been engaged as supervising engineer.

MINDEN, LA.—Within the next three months the Minden El. Lt. & Pwr. Co. expects to overhaul its lines and to purchase new poles and cross-arms. J. S. Maxwell is superintendent.

CHICKASHA, OKLA.—Bids will be received at the office of the supervising architect, Treasury Department, Washington, D. C., until Dec. 1, for the installation of an electric passenger elevator in the United States post office at Chickasha. For details see proposal columns.

CLEBURNE, TEX.—Contracts, it is reported, have been awarded for a power house for the proposed electric-light plant and water-works to cost about $5,000.

McKINNEY, TEX.—The City Commission has awarded a contract for a new power station for the city water and lighting plant, to cost about $5,000.

Pacific States

EDISON, WASH.—A subsidiary company of the Stone & Webster Corporation, with main office in Seattle, is planning to erect a substation in Edison to supply electricity in Edison, Blanchard and also to farmhouses near by. Transmission lines will also be extended through the Skagit Valley to furnish electricity for lamps and motors to ranches along the line.

PARKLAND, WASH.—A proposal to install an electrical distribution system in Parkland, to be connected with the transmission lines of the Tacoma municipal electric plant, at a cost of $9,000, has been submitted to the co-operative stockholders of the Parkland Lt. & Wtr. Co. A committee has been appointed by the company to raise funds for financing the project.

SEATTLE, WASH.—Bids will be received by A. L. Valentine, chairman of board of public works, until Nov. 13 for furnishing the city lighting department with one year's supply of distribution transformers, in accordance with specifications on file with the Board of Public Works.

SEATTLE, WASH.—A. L. Valentine, chairman of board of public works, it is understood, will ask for bids for furnishing material and installing a cluster-lamp lighting system on Columbia, Marion and Madison Streets, from First to Railroad Avenue. The cost of the work is estimated at $5,000, to be paid by property owners.

SPOKANE, WASH.—The contract for installing the electrolier lighting system on First Avenue has been awarded to the William E. Chase Engineering Co., at $66,429. The company has announced that it will purchase energy to maintain the system from the Washington Wtr. Pwr. Co.

PORTLAND, ORE.—The City Commission has authorized Municipal Purchasing Agent Wood to advertise for bids for the installation of an electric-light system in Columbia Park; also for bids for remodeling the lighting system in Peninsula Park.

PORTLAND, ORE.—Special appropriations have been made by the City Commissioners for installing lighting system in the city parks as follows: For Holladay Park, $1,140; Kenilworth Park, $1,500, and Laurelhurst Park, $8,000. Bids for this work, it is understood, will be asked before the first of the year.

BAKERSFIELD, CAL.—The County Commissioners of Kern County have awarded the contract for the erection of a 10-mile transmission line to supply energy to operate the new county rock-crushing plant to the Power Equipment Co., Rialto Building, San Francisco. The transmission line as well as the telephone line will be of ¼-in. Siemens-Martin steel cable, supported on suspension cables.

ESCONDIDO, CAL.—The Escondido Mutual Water Co. has applied to the Board of Supervisors for a franchise to erect a transmission line from its reservoir on the San Luis River to Escondido and to install a distributing system in this city. The company proposes to generate electricity at the dam site and deliver the same to its customers here.

HOLTVILLE, CAL.—The State Railroad Commission has granted the Holton Pwr. Co., of Holtville, permission to issue $200,000 in bonds (to be sold at not less than 80), the proceeds to be used for extensions and improvements to its system, including the construction of a substation at El Centro, to cost $45,000, and the erection of a transmission line from El Centro to Seeley and Dixieland, at a cost of $12,078.

SAN FRANCISCO, CAL.—Plans are being prepared by the Mission Street Merchants' Association for installing an ornamental street-lighting system on Mission Street between Sixteenth Street and Twenty-fourth Street. J. J. Chick is chairman of lighting committee.

SAN FRANCISCO, CAL.—The State Railroad Commission has authorized the Northern California Pwr. Co., of San Francisco, to issue 5000 shares of capital stock, to be sold at not less than $80 per share, the proceeds of $225,000 to be used for reimbursing capital account and $175,000 for additions and improvements to its properties.

PLACERVILLE, IDAHO.—The National Mining & Development Co., of Placerville, is equipping its mine with electrically operated machinery. A complete electric-lighting system will also be installed. The Golden Age Mining Co., is also preparing to equip its mine with electrically operated machinery.

THOMPSON FALLS, MONT. — The Thompson Falls Pwr. Co. has applied for right-of-way for the Cœur d'Alene transmission lines through certain sections in this vicinity.

Canada

NEW DENVER, B. C.—Plans are being considered, it is reported, by the New Denver Pwr. Co. for rebuilding its power plant, which was destroyed by fire last summer. The company also contemplates extensions of its transmission lines into outlying sections.

TORONTO, ONT.—The advisory industrial committee has appropriated $45,000 for the purchase of engines, generators and other machinery in connection with the equipment of the new technical school.

Miscellaneous

WRANGELL, ALASKA.—The Wrangell El. Lt. & Pwr. Co. is now changing its system from direct to alternating current and is installing two 25-hp Fairbanks-Morse type Y oil engines with a 75-kva, three-phase, 60-cycle, 2200-volt Fairbanks-Morse generator. O. C. Palmer is owner and manager.

TATUHY, SAO PAULO, BRAZIL.—Manoel Guedes, owner of a central station with an output of 1140 kva, is in the market for a waterwheel and alternator having a rating of 750 kva. For further information address Manoel Guedes, care of Octavio Moraes, Tatuhy, Sao Paulo, Brazil.

New Incorporations

PHOENIX, ARIZ.—The Falls Pwr. & El. Co. has been incorporated by C. M. Etter, John Munson, A. C. Bailey, W. S. Perry and T. T. Powers, all of Phoenix. The company is capitalized at $100,000 and proposes to construct and operate gas and electric plant and telephone and telegraph systems.

FREEPORT, TEX.—The Freeport Lt., Wtr. & Ice Co. has been incorporated with a capital stock of $5,000 by C. A. Jones and others.

LOGAN, W. VA.—The Logan Lt. & Pwr. Co. has been incorporated with a capital stock of $1,500,000 by George W. Stevens, Jr., E. S. Aleshire and R. P. Aleshire, of Huntington; Curtis McComas, of Barbersville, and W. C. Lawrence, of Logan. The company proposes to build a large power plant at Logan from which it will distribute electricity to the various mining corporations in Logan County and through the Guyandotte Valley.

Directory of Electrical Associations

ALABAMA LIGHT AND TRACTION ASSOCIATION. Secretary-treasurer, H. O. Hanson, Mobile Gas Co., Mobile, Ala.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE. Permanent secretary, L. O. Howard, Smithsonian Institution, Washington, D. C. Annual meeting, Philadelphia, Dec. 28, 1914, to Jan 2, 1915.

AMERICAN ELECTRIC RAILWAY ACCOUNTANTS' ASSOCIATION. Secretary-treasurer, E. B. Burritt, 29 West 39th St., New York.

AMERICAN ELECTRIC RAILWAY ASSOCIATION. Secretary, E. B. Burritt, 29 West 39th St., New York.

AMERICAN ELECTRIC RAILWAY ENGINEERING ASSOCIATION. Secretary, E. B. Burritt, 29 West 39th St., New York.

AMERICAN ELECTROCHEMICAL SOCIETY. Secretary, Prof. J. W. Richards, Lehigh University, South Bethlehem, Pa.

AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION. Secretary, Dr. J. Willard Travell, 27 East 11th St., New York.

AMERICAN INSTITUTE OF CONSULTING ENGINEERS. Secretary, Eugene W. Stern, 101 Park Ave., New York City.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Secretary, F. L. Hutchinson, 33 West 39th St., New York. Board of directors meets monthly. Sections and branches in the principal electrical centers throughout the country.

AMERICAN PHYSICAL SOCIETY. Secretary, Prof. A. D. Cole, Ohio State University, Columbus, Ohio.

AMERICAN SOCIETY OF REFRIGERATING ENGINEERS. Secretary, William H. Ross, 154 Nassau St., New York City. Annual meeting, New York, Nov. 30-Dec. 1.

AMERICAN SOCIETY FOR TESTING MATERIALS. Secretary-treasurer, Edgar Marburg, University of Pennsylvania, Philadelphia.

AMERICAN SOCIETY OF HEATING AND VENTILATING ENGINEERS. Secretary, Edwin A. Scott, 29 West 39th St., New York.

AMERICAN WATER WORKS ASSOCIATION. Secretary, J. M. Diven, 47 State St., Troy, N. Y.

ARKANSAS ASSOCIATION OF PUBLIC UTILITY OPERATORS. Secretary, W. J. Tharp, Little Rock, Ark.

ASSOCIATION OF EDISON ILLUMINATING COMPANIES. Assistant secretary, Walter Neumuller, Irving Place and 15th St., New York.

ASSOCIATION OF IRON AND STEEL ELECTRICAL ENGINEERS. Secretary, W. T. Snyder, McKeesport, Pa.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS. Secretary-treasurer, Jos. A. Andreucetti, Chicago & Northwestern Railway, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS. Secretary, P. W. Drew, 112 West Adams St., Chicago.

CALIFORNIA ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, W. S. Hanbridge, 1408 Merchants' National Bank Building, Los Angeles, Cal.

CANADIAN ELECTRICAL ASSOCIATION. Affiliated with N. E. L. A. Secretary-treasurer, Alan Sullivan, 610 Confederation Life Bldg., Toronto, Can.

COLORADO ELECTRIC CLUB. Secretary, C. F. Oehlmann. Meets every Thursday at Albany Hotel, Denver, Col.

COLORADO ELECTRIC LIGHT, POWER AND RAILWAY ASSOCIATION. Secretary-treasurer, T. F. Kennedy, 900 15th St., Denver, Col.

COMMERCIAL SECTION, N. E. L. A. Secretary, J. F. Becker, 1170 Broadway, N. Y.

EASTERN NEW YORK SECTION, N. E. L. A. Secretary, C. S. Van Dyck, Schenectady, N. Y.

ELECTRIC CLUB OF CHICAGO. Secretary, Howard Ehrlich, 608 South Dearborn St., Chicago. Meets every Thursday noon at Hotel Sherman.

ELECTRICAL CONTRACTORS' ASSOCIATION OF GREATER BOSTON. Secretary, R. S. Hale, 39 Boylston St., Boston.

ELECTRICAL CONTRACTORS' ASSOCIATION OF MASSACHUSETTS. Secretary, H. D. Temple, 30 Foster St., Worcester, Mass.

ELECTRICAL CONTRACTORS' ASSOCIATION OF NEW YORK STATE. Secretary, Geo. W. Russel, Jr., 25 West 42d St., New York.

ELECTRICAL CONTRACTORS' ASSOCIATION OF THE CITY OF CHICAGO. Secretary, M. N. Blumenthal, 179 West Washington St. Meets at noon on the second and fourth Wednesday of each month at 424 South Wabash Ave.

ELECTRICAL CONTRACTORS' ASSOCIATION OF STATE OF MISSOURI. Secretary, A. J. Burns, 318 West Tenth St., Kansas City, Mo.

ELECTRICAL CONTRACTORS' ASSOCIATION OF WISCONSIN. Secretary, Albert Petermann, 626 Lloyd St., Milwaukee, Wis.

ELECTRICAL CREDIT ASSOCIATION OF CHICAGO. Secretary, Frederic P. Vose, 1343 Marquette Building, Chicago.

ELECTRICAL CREDIT ASSOCIATION OF PHILADELPHIA. Secretary, John W. Crum, 1324 Land Title Building, Philadelphia, Pa.

ELECTRICAL SALESMEN'S ASSOCIATION. Secretary, Francis Raymond, 125 Michigan Ave., Chicago, Ill.

ELECTRICAL SUPPLY JOBBERS' ASSOCIATION. General secretary, Franklin Overbagh, 411 South Clinton St., Chicago, Ill. Next meeting, Birmingham, Ala., Dec. 8-10.

ELECTRICAL TRADES ASSOCIATION OF CANADA. Secretary, William R. Stavely, Royal Insurance Building, Montreal, Can.

ELECTRICAL TRADES ASSOCIATION OF THE PACIFIC COAST. Secretary, Albert H. Elliott, Harding Building, 34 Ellis St., San Francisco, Cal. Meeting, San Francisco, second Thursday of each month.

ELECTRIC VEHICLE ASSOCIATION OF AMERICA. Executive secretary, A. Jackson Marshall, 29 West 39th St., N. Y. Sections in New York, New England, Chicago, Philadelphia, Washington and Los Angeles.

EMPIRE STATE GAS AND ELECTRIC ASSOCIATION. Secretary, Charles H. B. Chapin, 29 West 39th St., New York.

FARADAY ELECTRICAL ASSOCIATION. Secretary, W. J. Collins, 1129 Masonic Temple, Chicago. Meets at noon on the first and third Wednesday of each month at Planters' Hotel.

FRANKLIN INSTITUTE. Secretary, Dr. R. B. Owens, Philadelphia, Pa.

GAS, ELECTRIC AND STREET RAILWAY ASSOCIATION OF OKLAHOMA. Secretary-treasurer, Prof, H. V. Bozell, Norman, Okla.

GEORGIA ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, J. M. Clayton, Atlanta, Ga.

ILLINOIS STATE ELECTRICAL ASSOCIATION. Secretary, H. E. Chubbuck, Peoria, Ill.

ILLUMINATING ENGINEERING SOCIETY. General secretary, C. A. Littlefield, 29 West 39th St., New York.

INDEPENDENT ELECTRICAL CONTRACTORS' ASSOCIATION OF GREATER NEW YORK. Secretary, A. Newburger, 1153 Myrtle Ave., Brooklyn, N. Y.

INDEPENDENT TELEPHONE ASSOCIATION OF AMERICA. Secretary, W. S. Vivian, Grand Rapids, Mich.

INDIANA ELECTRIC LIGHT ASSOCIATION. Secretary, Thomas Donahue, Lafayette, Ind.

INDIANA STATE ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, George Skilman, Indianapolis, Ind.

INSTITUTE OF OPERATING ENGINEERS. Secretary, L. Houmiller, 29 West 39th St., New York.

INSTITUTE OF RADIO ENGINEERS. Secretary, E. J. Simon, 71 Broadway, New York.

INTERNAL COMBUSTION ENGINEERS' ASSOCIATION. President, Charles Kratsch, 416 West Indiana St., Chicago. Meeting second Friday of each month at Lewis Institute.

INTERNATIONAL ASSOCIATION OF MUNICIPAL ELECTRICIANS. Secretary, C. R. George, Houston, Tex.

INTERNATIONAL ENGINEERING CONGRESS. Secretary-treasurer, W. A. Cattell, Foxcroft Building, San Francisco, Cal. Congress, San Francisco, September, 1915.

INTERNATIONAL ELECTROTECHNICAL COMMISSION (international body representing various national electrical engineering societies contributing to its support). General secretary, C. le Maistre, 28 Victoria St., Westminster. London, S. W., England. Meeting at San Francisco, Sept. 9-11, 1915.

IOWA ELECTRICAL ASSOCIATION. Affiliated with N. E. L. A. Secretary, W. H. Thomson, Des Moines, Ia.

IOWA ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, M. T. Humphrey, Waterloo, Ia.

IOWA STREET AND INTERURBAN RAILWAY ASSOCIATION. Secretary, H. E. Weeks, Davenport, Ia.

JOVIAN ORDER. Jupiter (president), Homer E. Niesz, Chicago, Ill.; Mercury (secretary), E. C. Bennett, Syndicate Trust Building, St. Louis, Mo.

KANSAS GAS, WATER, ELECTRIC LIGHT AND STREET RAILWAY ASSOCIATION. Secretary-treasurer, Ivor Thomas, 237 South Main St., Wichita, Kan.

LOUISIANA ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, J. J. Ziegler, 227 Bourbon St. Meeting every Wednesday, Audubon Building, New Orleans.

MAINE ELECTRIC ASSOCIATION. Secretary-treasurer, Walter S. Wyman, Waterville, Maine.

MICHIGAN ELECTRIC ASSOCIATION. Affiliated with N. E. L. A. Secretary, Herbert Silvester, 18 Washington Boulevard, Detroit, Mich.

MINNESOTA ELECTRIC ASSOCIATION. Secretary-treasurer, F. A. Otto, St. Paul Gas Light Company, St. Paul, Minn.

MISSISSIPPI ELECTRIC ASSOCIATION. Affiliated with the National Electric Light Association. Secretary-treasurer, H. F. Wheeler, Hattiesburg, Miss. Next annual meeting, Hattiesburg, April 12-14, 1915.

MISSOURI ELECTRIC, GAS, STREET RAILWAY AND WATER WORKS ASSOCIATION. Secretary-treasurer, F. D. Beardslee, Union Electric Light & Power Co., St. Louis.

NATIONAL ARM, PIN AND BRACKET ASSOCIATION. Secretary, J. B. Magers, Madison, Ind.

NATIONAL ASSOCIATION OF ELECTRICAL INSPECTORS. Secretary-treasurer, Wm. L. Smith, Concord, Mass.

NATIONAL DISTRICT HEATING ASSOCIATION. Secretary, D. L. Gaskill, Greenville, Ohio.

NATIONAL ELECTRIC LIGHT ASSOCIATION. Executive secretary, T. C. Martin, Engineering Societies Building, 33 West 39th St., New York.

NATIONAL ELECTRICAL CONTRACTORS' ASSOCIATION OF THE UNITED STATES. Secretary, George H. Duffield, 41 Martin Building, Utica, N. Y.

NATIONAL ELECTRICAL CREDIT ASSOCIATION. Secretary, Frederic P. Vose, 1343 Marquette Building, Chicago.

NATIONAL FIRE PROTECTION ASSOCIATION. Secretary of electrical committee, Ralph Sweetland, 141 Milk St., Boston, Mass. Open meeting, New York, March, 1915.

NATIONAL INDEPENDENT TELEPHONE ASSOCIATION. Secretary-treasurer, J. B. Earle, Waco, Tex.

NEBRASKA SECTION, N. E. L. A. Secretary-treasurer, S. J. Bell, David City, Neb.

NEW ENGLAND ELECTRICAL CREDIT ASSOCIATION. Secretary, Alton F. Tupper, 60 State St., Boston, Mass.

NEW ENGLAND SECTION, ELECTRIC VEHICLE ASSOCIATION OF AMERICA. Secretary, L. L. Edgar, 39 Boylston St., Boston, Mass.

NEW ENGLAND STREET RAILWAY CLUB. Secretary, H. A. Faulkner, 12 Pearl St., Boston, Mass. Meets last Thursday of each month.

NEW ENGLAND SECTION, N. E. L. A. Secretary, Miss O. E. Bursiel, 149 Tremont St., Boston, Mass.

NEW ORLEANS ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, S. J. Stewart, 312 Carondelet St., New Orleans, La. Meetings second and fourth Tuesday of each month.

NEW YORK ELECTRIC RAILWAY ASSOCIATION. Secretary, Charles C. Dietz, 365 East 21st St., Brooklyn, N. Y.

NEW YORK ELECTRICAL CREDIT ASSOCIATION. Affiliated with the National Electrical Credit Association. Secretary, Franz Neilson, 80 Wall St., New York.

NEW YORK ELECTRICAL SOCIETY. Secretary, G. H. Guy, 33 West 39th St., New York.

NORTHWEST SECTION, N. E. L. A. Secretary, N. W. Brockett, Pioneer Building, Seattle, Wash.

NORTHERN WHITE CEDAR ASSOCIATION. Secretary, R. N. Boucher, 743 Lumber Exchange, Minneapolis, Minn.

OHIO ELECTRIC LIGHT ASSOCIATION. Secretary, D. L. Gaskill, Greenville, Ohio.

OHIO SOCIETY OF MECHANICAL ELECTRICAL AND STEAM ENGINEERS. Secretary, Prof. F. E. Sanborn, Ohio State University, Columbus, Ohio.

OREGON ELECTRICAL CONTRACTORS' ASSOCIATION. Secretary, F. C. Green, 291 East Morrison St., Portland, Ore.

PENNSYLVANIA ELECTRIC ASSOCIATION (State Section N. E. L. A.). Secretary-treasurer, H. N. Müller, Pittsburgh, Pa.

Railway Signal Association. Secretary-treasurer, C. E. Rosenberg, Times Building, Bethlehem, Pa.

Society for Electrical Development, Inc. General manager, J. M. Wakeman, 29 West 39th St., New York.

Society for the Promotion of Engineering Education. Secretary, Dean F. L. Bishop, University of Pittsburgh, Pittsburgh, Pa. Annual meeting, Ames, Ia., June 22-25, 1915.

Southeastern Section, N. E. L. A. Secretary-treasurer, Geo. H. Wygant, Tampa, Fla.

Southwestern Electrical and Gas Association. Secretary, H. S. Cooper, 405 Slaughter Building, Dallas, Tex.

Vermont Electrical Association. Secretary-treasurer, C. H. West, Rutland, Vt.

Western Association of Electrical Inspectors. Secretary, W. S. Boyd, 76 West Monroe St., Chicago, Ill. Annual meeting, Minneapolis, Minn., Jan. 26-28, 1915.

Western Society of Engineers, Electrical Section. Secretary, J. H. Warder, 1737 Monadnock Block, Chicago.

Wisconsin Electrical Association. Secretary, George Allison, 1410 First National Bank Building, Milwaukee, Wis.

Weekly Record of Electrical Patents

UNITED STATES PATENTS ISSUED OCT 27, 1914.

[Prepared by Robert Starr Allyn, 16 Exchange Place, New York, N. Y.]

1,114,719. Terminal Connector; C. W. Beck, Rockville Center, N. Y. App. filed Oct. 18, 1911. Claims connector for spark plugs.

1,114,725. Means for Determining Time Intervals in Telephone Systems; W. G. Blauvelt, New York, N. Y. App. filed May 4, 1911. Especially for automatic selecting switches.

1,114,727. Electric Motor and Pump Connected Thereto; J. F. Breeze, Hammersmith, England. App. filed July 28, 1911. Centrifugal pump exhausts the cooling water from the motor.

1,114,733. Electric Furnace; W. N. Crafts, Oberlin, Ohio. App. filed Nov. 28, 1911. High-capacity induction furnace with an unrestricted bath.

1,114,759. Windmill-Power Plant; A. H. Heyroth, Great Falls, Mont. App. filed Dec. 17, 1912. Special automatic regulation.

1,114,760. System of Electrical Supply; A. H. Heyroth, Great Falls, Mont. App. filed Jan. 3, 1913. Control of generator in respect to storage battery.

1,114,766. Inherent-Power-Return Signal Mechanism; W. K. Howe, Rochester, N. Y. App. filed Feb. 16, 1911. Alternating-current system employing a phase-splitting device.

1,114,788. Automatic Draft Regulator; R. P. Mercer, Burlington, Ia. App. filed March 14, 1914. For furnaces; operated by electric motor.

1,114,802. Storage Battery; W. E. Poole, Chicago, Ill. App. filed Feb. 20, 1914. Has improved venting arrangement.

1,114,805. Electrical Pressing Iron; A. E. Reimers, New York, N. Y. App. filed Nov. 2, 1911. Resistance unit constructed to permit a graduated control of the heat.

1,114,813. Safety Switch; H. B. Shreve, Chicago, Ill. App. filed Jan. 11, 1913. For elevator doors.

1,114,816. Rotary Hydrocarbon Engine; S. G. Stapp, Philadelphia, Pa. App. filed Jan. 19, 1911. Special ignition system.

1,114,823. Electro-Pneumatic Control Valve; W. V. Turner, Edgewood, Pa. App. filed May 3, 1911. Eectric control does not interfere with the pneumatic control.

1,114,831. Electric Switch; C. G. White, Detroit, Mich. App. filed Feb. 2, 1914. Permutation type.

1,114,840. Wireless Telegraphy; W. C. Woodland, Warren, Ohio. App. filed Oct. 24, 1912. Increases the pitch of the tone heard at the receiving station.

1,114,842. Attachment for Telephone Stands; L. E. Wright Fairgrange, Ill. App. filed Dec. 19, 1913. For supporting the receiver at the ear.

1,114,845. Electric Relay; H. De F. Arnold, East Orange, N. J. App. filed May 16, 1914. For use in connection with an audion.

1,114,872. Electrical System of Distribution; S. H. Everett, Jr., Brooklyn, N. Y. App. filed July 9, 1909. Storage-battery system.

1,114,902. Telephone Receiving Instrument; T. B. Miller, Seattle, Wash. App. filed Sept. 25, 1912. Especially sensitive for wireless work.

1,114,904. Printer for Printing-Telegraph Systems; D. Murray, London, England. App. filed April 16, 1913. Typewriter class.

1,114,905. Printing Telegraph System; D. Murray, London, England. App. filed April 16, 1913. Two reproducers, a printer and a perforator at the receiving station.

1,114,939. Selective Signal System; W. R. Tomlin, Fort Collins, Col. App. filed Feb. 27, 1914. For selectively ringing bells on a party line.

1,114,953. Arc-Light Electrode; A. V. Wilker, Berea, Ohio. App. filed Jan. 22, 1912. Contains cerium silicide.

1,114,982. Working Submarine Cables; J. Gott, Brighton, England. App. filed March 18, 1912. Every unit of each letter is formed by a reversed current.

1,114,988. Electrical Switch; B. D. Horton, Detroit, Mich. App. filed April 5, 1913. "Armor-clad" type operated by crank inserted through casing.

1,115,018. Storage Battery; W. E. Poole, Chicago, Ill. App. filed May 23, 1914. Vent permits tilting of battery without spilling electrode.

1,115,022. Deflated-Tire Detecter; H. C. Quick, Oakland, Cal. App. filed March 21, 1914. Instrument on dashboard indicates deflation of a tire.

1,115,027. Electrode; R. L. Seabury, Lakewood, Ohio. App. filed Aug. 2, 1911. Method of joining electrodes for electric furnaces.

1,115,053. Telephone Receiver; W. H. Cotton, Chicago, Ill. App. filed Oct. 25, 1912. Prevents excessive vibration of the diaphragm.

1,115,075. Electric Cooker; M. L. Keagy, Canton, Ohio. App. filed April 11, 1912. Small portable type.

1,115,084. Trolley-Wheel Mount; B. Milewski, Kent, Ohio. App. filed May 14, 1914. Has self-lubricating features.

1,115,091. Protective Switch Box; T. E. Murray, New York, N. Y. App. filed Oct. 21, 1913. Opening of the cover breaks the circuit.

1,115,092. Electric Lock Switch; W. C. Neahr, Denver, Col. App. filed June 4, 1913. Operated by an inserted key, which, when turned, is held in the switch.

1,115,114. Connecter for Electric Conductors; H. H. Russell, Chicago, Ill. App. filed March 21, 1913. Quick detachable plug-and-socket type.

1,115,130. Permutation Switch Lock; E. E. Theis, Dayton, Ohio. App. filed Feb. 9, 1914. For automobile ignition circuits.

1,115,135. Electric Terminal Connector; F. Wagner, Natrona, Pa. App. filed Jan. 2, 1913. Clamp for taking current from overhead trolley wire.

1,115,154. Electrical Distribution System for Automobile Control; V. G. Apple, Dayton, Ohio. App .filed Oct. 12, 1911. Motor-generator system.

1,115,158. Locomotive Truck; A. F. Batchelder, Glenville, N. Y. App. filed July 24, 1914. Has the same rolling effect as a steam locomotive.

1,115,174. Coherer Discharge Indicator; E. E. F. Creighton, Schenectady, N. Y. App. filed May 11, 1912. Operates on both great and small charges.

1,115,195. Welding Machine; E. T. Hendee, Chicago, Ill. App. filed May 4, 1914. For boiler flues; electric heat.

1,115,220. Rotary Field Magnet with Two Poles; F. Liungström, Finspang, Sweden. App. filed Jan. 24, 1914. U-shaped winding has dovetailed engagement with magnet core.

1,115,249. Means for the Production of Long Continuous Electric Arcs; O. Schonherr, Christiania, and J. Hessberger, Christiansand, Norway. App. filed May 18, 1910. Gas passed through arc tube in different directions.

1,115,251. Method of Operating Electromagnetic Striking Tools by Means of Alternating Current; L. Schüler, Berlin-Lichterfelde, West Germany. App. filed Aug. 30, 1912. Uses synchronous interrupters.

1,115,264. Oil Switch; E. B. Wedmore, Rugby, England. App. filed July 11, 1908. Special features of manual control, contacts and tank.

1,115,278. Shin's Engine-Room Signal; O. K. Bohstrand, New York, N. Y. App. filed May 2, 1913. Telltale indicates operation of machinery in response to signals.

1,115,283. Electric Clock; L. Cerf, New York, N. Y. App. filed March 11, 1914. Driving power is the solenoid connected with a local electric battery.

1,115,286. Electro-Pneumatic Air-Brake System; J. P. Costelloe, Medicine Hat, Alberta, Canada. App. filed April 1, 1914. Applicable to standard brake systems.

1,115,289. Alternating-Current Dynamo-Electric Machine; L. Dreyfus and F. Hillebrand, Niederschönhausen, Germany. App. filed Sept. 4, 1912. Polyphase type.

1,115,317. Preparing Electrodes for Electric Welding or Soldering; O. Kjellberg, Gothenburg, Sweden. App. filed Jan. 29, 1912. Iron rod covered with special paste.

1,115,324. Telephone Release-Insurance Means; T. G. Martin, Chicago, Ill. App. filed July 6, 1908. For use in systems where a manual switchboard operator is given control of automatic trunk selectors.

1,115,351. Process of Separating Metals from Ores; H. A. Wagner, East Orange, N. J. App. filed Jan. 27, 1914. Recovery of copper, zinc, etc., from sulphide and similar ores by electrolysis.

1,115,352. Dynamo-Electric Machine; M. Walker, Old Trafford, England. App. filed Dec. 6, 1907. High-speed commutator machine.

1,115,359. Electric Burglar-Alarm System; J. P. Williams, New York, N. Y. App. filed April 27, 1910. For protection of a vault or safe.

1,115,364. Automatic Train Control for Cab Signals; B. F. Wooding, Denver, Col. App. filed July 15, 1912. Operation depends on normally closed train circuit.

1,115,396. Alarm Attachment for Clocks; H. W. Christensen, Monmouth, Ill. App. filed June 14, 1911. Rotation of the hand closes circuit and rings bell.

1,115,406. Dynamo-Electric Machine; J. Le C. Davis, Pittsburgh, Pa. App. filed June 14, 1912. Has special air-circulating cooling system.

1,115,440. Dynamo-Electric Machine; F. R. Kunkel, Edgewood Park, Pa. App. filed July 6, 1908. Air currents are circulated through the core.

1,115,446. Circuit-Controlling Device; O. M. Leich, Genoa, Ill. App. filed Feb. 20, 1913. Transmits a prolonged impulse when the receiver hook is moved up or down.

1,115,447. Pot-Head or End Bell; H. P. Liversidge, Philadelphia, Pa. App filed April 6, 1910. Clamping pot-head which avoids the injurious effects of electrostatic discharge.

1,115,448. Circuit-Breaker; A. J. Loguin, West Allis, Wis. App. filed Dec. 12, 1910. Makes a contact with an oblique slicing action.

1,115,452. Variable-Speed Direct-Current Generator; A. Richter, Chicago, Ill. App. filed Oct. 22, 1913. Regulation of small generators such as are used on motorcycles.

1,115,455. Electrical Distribution System; P. H. Thomas, Pittsburgh, Pa. App. filed March 5, 1903. Using vapor converter.

1,115,456. Electrical Distribution System; P. H. Thomas, Pittsburgh, Pa. App. filed March 5, 1903. Vapor converter and regulating magnets.

1,115,458. Dry Cell; W. G. Waitt, Fremont, Ohio. App. filed March 24, 1913. Fills can with oil to wet the surface, empties and then adds the powdery material to the wetted surface.

1,115,461. Electric Welding Machine; W. E. Andrews, Bellaire, Ohio. App. filed July 6, 1914. For welding seams of tubular metal articles.

1,115,463. Electrode Element; T. A. Edison, Llewellyn Park, West Orange, N. J., App. filed June 17, 1910. Automatic filling and stamping of active material into small perforated tubes.